NATIONAL INSTITUTES OF SCIENCE AND TECHNOLOGY – INCT

MONITORING AND EVALUATION

PERIOD: de 2/4/2011 a 2/4/2012

IDENTIFICATION OF THE PROPOSAL

TITLE: INCT of Complex Fluids (INCT-FCx)

Number: 573560/2008-0

Term: from 2/4/2009 to 2/4/2014

Total funding: R$ 4.200.000,00
General expenditures: - R$ 1.320.697,94
Capital: - R$ 2.732.650,06
Fellowships: - R$ 146.652,00

COORDINATOR: Antonio Martins Figueiredo Neto

MAIN INSTITUTION: USP

PARTICIPATING INSTITUTIONS: (see the submission form)

MEMBERS OF THE PROPOSAL: (see the submission form)

RESEARCH PROPOSAL (Attach to the partial report)

Were there any changes of the goals and targets of the proposal? () YES (X) NO

If yes, report these changes:

Were there any changes in the original chronogram? ( ) YES (X) NO

If yes, report these changes:

Were there any problems to develop the proposal? (X) YES ( ) NO
If yes, report these changes:
There is still the problem already mentioned in previous reports related to the very small number of scholarships from CAPES for the INCT. CAPES did not have the additional resources for the INCTs as CNPq / MCT / FAPs. There was then a very small number of scholarships for the INCTs, which in real terms led to extra work of the team of members to resubmit projects (included in the same INCT) to obtain scholarships for the students from the agencies. The program Science Without Borders did not alleviate the problem because it does not refer to scholarships within the country.

MEMBERS

WERE THERE ANY CHANGES IN THE INITIAL COMPOSITION OF THE RESEARCH TEAM? (X) YES ( ) NO

If yes, report these inclusions and exclusions:
There was just one inclusion, of Dr. Roberto Kopke Salinas, from IQ-USP, who is a specialist oin NMR of biological materials (http://lattes.cnpq.br/6171517695707255)

DESCRIBE MECHANISMS OF INTERACTION BETWEEN PARTICIPATING RESEARCH

GROUPS OF THE INCT:

We have different mechanisms of interaction.
1) One is the Website (http://fluidos.usp.br) INCT-FCX. In it there is a description of the team, available experimental facilities and discussion forums.
2) We conduct an annual school for students from different members and other interested groups and a scientific meeting with international participation.
3) We conduct periodic seminars at the headquarters of INCT to discuss aspects of ongoing research. The seminars are recorded and made available at the website and are also transmitted in real time via IPTV USP.
The Steering Committee held regular meetings to evaluate partial results and give suggestions of possible corrections.

REPORT EVENTUAL DIFFICULTIES OF THE PARTICIPATING RESEARCH GROUPS AND THE MECHANISMS TO OVERCOME THESE DIFFICULTIES:

No difficulties.

WAS THERE EITHER THE INCLUSION OR THE EXCLUSION OF ANY INSTITUTIONS OR COMPANIES? (X) YES () NO

1, Biotec-Hospital Products, Mairiporã/SP, CNPJ: 07.204.591/0001-68; State Registration: 433 097 131 111, (Mr. Reinaldo M. Cavazzani, Director). Through employee José Marcos Alves de Souza Almeida (B. Sc. student at IFUSP), who has extensive experience in public tenders, including contacts with the sectors of materials engineering and clinical centers at several hospitals related to national an international companies, we could offer some of the technology developed in recent years. Companies that were contacted showed great interest in biological materials with applications, which we usually consider as systems for academic study. We are elaborating a draft of a proposal with Biotec to be presented as an agreement with IFUSP. Biotec itself develops its own patent to produce healing sores to be used in patients in intensive care units over a long period. At the INCT-IFUSP, we will apply metallic silver nanoparticles in different polymers, which is part of this kind of healing product. We keep contact with companies in the area of hospital and dental materials, which use low cost materials, as recently developed paste based on hydroxyapatite as well as magnetic ferrofluids.

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OBTAINED RESULTS / TARGETS

LIST AND COMMENT THE OBTAINED SCIENTIFIC AND/OR TECHNOLOGICAL RESULTS:

A – RESEARCH:
In the annexed "Research Report", we highlight some topics that deserve attention, as the research with multidisciplinary focus, one of the main fundamental characteristics of our Institute. This text points out the interactions between groups that were fostered by the INCT.

B – TRAINING OF HUMAN RESOURCES:
We trained 17 doctors and 21 masters in this period. In addition, we promoted the training of students in various undergraduate research programs, completed and in progress in the different groups and associated laboratories. We tried, wherever possible, to make our students gain experience in different groups and laboratories of the Institute, not only in the group or laboratory of origin.

C – TRANSFER OF KNOWLEDGE AND TECHNOLOGY:
The work of the INCT allowed the generation of patents, processes and products.
A more detailed description is given in the following item, on education and dissemination of science.

D – EDUCATION AND DISSEMINATION OF SCIENCE:

1) The FCX INCT-organized a Refresher Course for high school teachers in the city of Sao Paulo. We are writing a book in order to help the teacher in the classroom and also to support lectures of the structure of matter, in particular, in the area of complex fluids. In Appendix II we describe in more detail these activities.
2) The INCT provides a website with updated information about its activities, staff, expertise, experimental facilities, announcements of schools and meetings, and a discussion forum for researchers, educators and entrepreneurs.
3) The INCT organizes an annual School on Complex Fluids for their students and other interested people (see Annex II).
4) In the last year, the Institute of Physics at UFAL organized the Fourth Workshop of the UFAL Program of Graduate Studies, under the overall coordination of Professor Italo Nunes de Oliveira, a member of the FCX-INCT. This event was attended by team members INCT of complex fluids. It involved nearly 90 undergraduate and postgraduate students in physics from different states of the Northeast, thus allowing the dissemination of the results obtained by INCT-FCX in Northeastern community. In January 2012, at IF/UFAL, there was a course on "Methods and Quantum Molecular Simulations", taught by Kaline Coutinho and Sylvio Canuto from the IFUSP. This course included theoretical and practical sessions, with a public of graduate students. The course allowed students IF/UFAL and other institutions to learn the techniques used in the study of organic compounds with biological activity. In order to meet a recommendation of the last meeting of the Steering Committee of the INCT-FCX, researchers from IF / UFAL created two new graduate courses, Complex Fluids I and Complex Fluids II, with four credits each, which are intended to expand the number of skilled personnel to conduct research and activities related to complex fluids. These courses will include theoretical and practical classes, allowing the students the acquaintance with the basic techniques of characterization of liquid crystals, micellar systems, polymer and colloidal systems.

LIST THE IMPACT CAUSED BY ACTIONS AND RESULTS OF THE PROJECT FOR THE EXPANSION, CONSOLIDATION AND IMPROVEMENT OF NATIONAL TECHNICAL AND SCIENTIFIC COMPETENCE:

A – RESEARCH:
1) The study of virulence factors of atypical enteropathogenic Escherichia coli allowed the identification of important secreted microbial factors, with the potential to control intestinal colonization of an important etiological agent causing diarrhea in children. The continuity of this study, which aims to isolate and characterize this factor, opens the possibility of identifying patentable products of medical importance to the control and prevention of diarrhea caused by this bacterium. Dr. Rita Ruiz, Instituto Butantan.
2) The studies on lipoproteins during this period had a significant improvement, particularly as regards the identification of changes associated with an atherogenic effect. We have found that the diffusion coefficient of thermal solutions with modified LDL (oxidized) is much higher than in the case of native LDL solutions. This work involved research groups from the Institute of Physics, Chemistry and Biomedical Sciences at USP.

B – TRAINING OF HUMAN RESOURCES:
Most of Masters trained under the INCT have continued their work in PhD projects. The doctors have joined post-doctoral programs in Brazil and abroad. Most of the undergraduate students, with a string multidisciplinary background, have enrolled into graduate courses.

C – TRANSFER OF KNOWLEDGE AND TECHNOLOGY:
Research results led to some INCT transfer processes and products: 1) - Sterilization of Hydroxy Apatite - HA - by physical process; 2) preparation of nanoparticulate HA, which is a grease containing magnetic nanoparticles and technology; synthesis and applications of the magnetic colloids.
D – EDUCATION AND DISSEMINATION OF SCIENCE:
The INCT holds an annual Summer School and organizes at least a refresher course for high school teachers. We have proposed new multidisciplinary disciplines and courses in some universities. Interviews and texts as a means of dissemination have been used to disseminate the knowledge generated by INCT.

FOR DISCLOSURE, LIST THE OBTAINED RESULTS THAT DESERVE ATTENTION IN TERMS OF SCIENTIFIC, TECHNOLOGICAL OR SOCIAL DEVELOPMENT:

1) Dr. Yan Levin developed new theories to describe electrolyte solutions. This work had national and international repercussions, with notes in Physical Review Focus (http://focus.aps.org/story/v24/st25), Revista FAPESP (**http://revistapesquisa.fapesp.br/?art=4185&bd=1&pg=1&lg**=, and the CERN Courier (http://cerncourier.com/cws/article/cern/41450). He also introduced a new theory that allows to study systems with long-range forces, such plasmas and gravitation.
2) Espósito Dr. Giancarlo developed nanoparticulate and hydrophilic hydroxyapatite, in the gel and paste forms. This material, which is used as an bone driver, was implanted in the subcutaneous tissue of rats (between the skin and muscle tissue, lumbar) for biocompatibility testing. In samples collected between 7 and 40 days after euthanasia of animals, histological studies were performed in the region where the material was implanted. Surprisingly, the material collected after 40 days was totally absorbed by the animal, which allowed the its application in several cases of bone defects and problems. This year we plan to repeat this experiment with the same material, but this time, the particles of HA will be marked with points of magnetite nanoparticles in ionic form in aqueous ferrofluid. This procedure will be able to follow the fate of HA in vivo in mice by magnetic resonance imaging. Depending on the results of this innovative material, it may be used as bone conductor in serious fractures and injuries by reducing the recovery time of injured patients. It is worth realarking that on this project we developed a methodology for sterilization of the material. Both processes are under study in terms of a patent of FOBUSP and IFUSP.
3) Dr. Lionel Gamarra obtained an international patent (United States and Japan), related to a method for isolating exosomes from biological solutions using oxide nanoparticles (WO201021335 PCT PCT).
4) The paper by Dr. Jose Americo Miranda, "Diffuse-interface approach to rotating Hele-Shaw flows" [Phys. Rev. E 84, 046302 (2011)], was selected to appear in the section of Physical Review E, KALEIDOSCOPE, in its edition of October 2011 (accessed online via the link http://pre.aps.org/kaleidoscope/pre/84/4 / 046 302).
5) Dr. Kathy Perez deposited a patent (Zucolotto, V.; Ciancaglini, P., Oliveira, ON, Santos, FR; Prinotto, CA, Perez, KR; Gimenez, MCC; Stabile, RG; Patent filed. Biosensor having interdigitated electrodes for Application in Detection and Diagnosis in Nanomedicine). Deposited on 31.10.2011 under the protocol number: 018110042197.
6) Dr. Lilia C. Courrol developed studies to show that the LDL in its oxidized state is more atherogenic than LDL in its native state. However, the methods developed for the oxidation of LDL in vitro do not represent the oxidized LDL in the human body. Therefore, a new method was developed for oxidation of the LDL particles by laser irradiation of ultra short pulses, which is supposed to mimic the oxidation that occurs in vivo.

RESULTS IN NUMBERS

A – INDICATORS OF RESEARCH	
NUMBERS OF THE TECHNICAL, SCIENTIFIC AND ARTISTICAL PRODUCTION IN THE PERIOD (enclose references):	
TYPE	**QUANTITY**
BOOKS	
CHAPTERS OF BOOKS	20
ARTICLES IN NATIONAL JOURNALS	~10
ARTICLES IN INTERNATIONAL JOURNALS	~153
PAPERS IN NATIONAL MEETINGS	~80
PAPERS IN INTERNATIONAL MEETINGS	~150
SOFTWARE	
PATENTS	2
PRODUCTS	2
PROCESSES	1
ARTISTIC PRODUCTION (SPECIFY)	
OTHER (SPECIFY):	35

B – INDICATORS ABOUT THE FORMATION OF HUMAN RESOURCES	
NUMBERS ON THE FORMATION OF HUMAN RESOURCES IN THE PERIOD	
TYPE	**QUANTITY**
COMPLETED:	
SCIENTIFIC INITIATION	8
MASTER	21
DOCTOR	17
POST-DOCTOR	2
OTHER (SPECIFY):	
ONGOING:	
SCIENTIFIC INITIATION	23
MASTRE	39
DOCTOR	56
POST-DOCTOR	9
OTHER (SPECIFY):	

C – INDICATORS OF KNOWLEDGE AND TECHNOLOGY TRANSFER	
NUMBERS OF THE PRODUCTION IN THE PERIOD (specify and enclose references):	
TYPE	**QUANTITY**
1) Process: Sterilization of Hydroxy Apatite - HA - by Physical Process	1
2) Products: HA nanoparticle, grease containing magnetic nanoparticles	2
3) Patent:	
1) INTERNATIONAL PATENT (U.S. and Japan) L. F. Gamarra et al. Method for Isolating exosomes from biological solutions using oxide nanoparticles. WO201021335 PCT PCT.	2
2) Dr. Kathy Perez: Zucolotto, V.; Ciancaglini, P., Oliveira, ON, Santos, FR; Prinotto, CA, Perez, KR; Gimenez, MCC; Stabile, RG; Patent filed. Biosensor having interdigitated electrodes for Application in Detection and Diagnosis in Nanomedicine. Deposited on 31.10.2011 under the protocol number: 018110042197.	

D – INDICATORS OF EDUCATION AND DISSEMINATION OF SCIENCE	
NUMBERS OF THE PRODUCTION IN THE PERIOD (specify and enclose references):	
TYPE	**QUANTITY**
Refreshing Courses Summer Courses	1 1

ADDITIONAL INFORMATION

DESCRIBE OTHER FORMS OF MAKING PUBLIC THE RESULTS OF THE PROJECT:

1) Results obtained by the INCT-FCX are available in the website.
2) Schools of Complex Fluids are directed both to our students at different levels as well as to interested students (undergraduates, masters, PhDs and post-docs) of the different areas involved in the INCT.
3) Regular seminars are organized at the headquarters in São Paulo with wide distribution. They are recorded and made available at the website and are broadcasted in real time by IPTV-USP. The refresher course for high school teachers is also a way to show our research results.
4) Interviews of INCT members to the press.

DESCRIBE THE IMPROVEMENTS IN THE PHYSICAL INSTALLATIONS IN THE HOME INSTITUTION AND IN THE ASSOCIATED LABORATORIES, AS PHYSICAL ADAPTATIONS, EQUIPMENT, ETC:

1) UEPG: A portion of funds that were attributed to the group of photothermal phenomena in complex fluids at the UEPG, together with additional funds from other federal and state agencies, were used to establish a laboratory of nonlinear optics, which is unique at the UEPG, and which give rise to collaborations with other groups and universities.
2) UFAL: The FCX-INCT was the main financing source for the creation of the laboratory of anisotropic liquids and polymers. This laboratory, with a total area of 36m2, is suitable for the handling and preparation of samples and for the measurements and analysis of results. In the space for handling and preparation of samples, funds from the INCT were used for the acquisition of all basic equipment, such as chapel of exhaust gases, micro processed stove, and vacuum damp, among others. In the space reserved for measurements of viscoelastic properties and nonlinear optical properties of liquid crystals, funds from the INCT were used for the acquisition of most of the equipment: laser source of 6W, goniometer, photomultipliers, digital correlator, and optical tensiometer. This equipment was essential for the establishment of all existing research lines at the laboratory. This infrastructure serves 6 graduate and 2 undergraduate students.
3) UNIFESP-DIADEMA: With funds from the INCT, we were able to operate an optical table and a dehumidifier in the laboratory. Also, we bought a microplate reader that will be used to read emission signals from the samples; an optical table to be used in measurements of nonlinear optical properties of complex fluids (organic compounds, lipoproteins, nanoparticles, in time scales of nanoseconds).

WERE THERE ACTIVITIES OF INTEGRATION WITH OTHER INCT'S: (X) YES ( ) NO

IF YES, GIVE SOME DETAILS:

1) DR. Rita Ruiz: Integration with the group of the INCT-TOX; contribution to the study of the action of 15 SBA mesoporous silica in professional Phagocytic cells. There was an article published in the collaboration in 2010.
2) DR. A.M. Figueiredo Neto: We have strong interactions with the researchers of the INCT REDOXOMA, with Prof. Dr. Sayuri Miyamoto, from IQUSP.
3) DR. Christian L.P. Olive: Colaborations with Dr. Marilena DeMasi of Butantan, who is a member of the INCT-REDOX, with works on biomedicine (redoxoma). Also, work with Prof. Marcia Fantini, from IFUSP, and Dr. Osvaldo Augusto Esteves Sant`Anna Brazil, from Butantan, who is the coordinator of INCT-TOX.
4) DR. Sergio Gomez: Interactions with researchers from the INCTs for public health and organic electronics.
5) UFAL: A large portion of the research activities at UFAL was done in collaboration with researchers from other INCTs: 1 – Research activities for the study of wave propagation in nonlinear media, in collaboration with Prof. Antônio Sérgio Sombra, from UFC, and the INCT on photonics for optical communications. 2 – Creation of an emerging center for the study of complex fluids (project sponsored by FAPEAL and CNPq), in collaboration with Dr. Ivan Helmuth Bechtold, from the DF/UFSC and the INCT on organic electronics. 3 – Research activities for the study of biocompatible biocompatible polymers and luminescent polymers; collaboration with Adriana Ribeiro Santos, from the IQB/UFAL, and the INCT on nanotechnology for integrated markers.
6) DR. Claudette Valduga: Development of research collaboration with researchers of the INCT on pharmaceutical innovation; work published in national magazine with members of this INCT.

7) Dr. Sarah Alves: work on nonlinear optical effects in organic compounds and nanoparticles, in collaboration with Prof. Luiz S. Longo Jr., from the INCT on pharmaceutical innovation.

CONSIDERAÇÕES FINAIS

COMMENT ON OTHER RELEVANT ASPECTS FOR THE GENERAL DEVELOPMENT OF THE PROJECT:

What is the role of the INCT for the formation of a network of research?

The INCT has been instrumental in promoting both the consolidation of different experimental laboratories in the network and the possibilities of interaction between team members and their students. The funds are easy to use in the exchange of visits and the replacement of equipment and consumer material. We have been able to use these funds to establish a computer cluster for domestic use.

EVALUATE THE DIALOGUE OF THE INCT WITH CNPq AND OTHER FINANCING AGENCIES OF THE PROGRAM:

The dialogue with CNPq has been adequate.

The dialogue with Fapesp has been very good. However, there is a problem to be dealt with in order to give more flexibility to the project. It is necessary to adequate the budget to the eventual needs of the INCT. Since FAPESP works on the basis of grant agreements, any small changes in the allocation of resources have to be requested to the foundation, and Fapesp reissues another term to be signed again. This process is long. It could be made more flexible in the case of the INCTS. It should be perfect if the funds were allocated per budget item, and if we could use them according to the momentary needs of the INCTs. Larger scale transpositions of funds should be requested as usual, but lesser amounts might be decided by the coordinator, without the need to issue another term of grant.

Enclose a report of partial results, **with a maximum of 50 pages**, with the following items:

1. Steering Committee – meetings and decisions;
2. Activities of cooperation between groups of participants of the INCT;
3. Activities of cooperation between the INCT and other institutions (companies, nongovernmental institutions, etc);
4. Main technical-scientific results;
5. National and international meetings: presentation of works, organization of courses, seminars, talks, round-tables;
6. Activities of formations of human resources;
7. Perspectives and future developments.

Place and date: São Paulo, 25 April 2012.

Signature:

National Institute of Science and Technology of Complex Fluids

(Partial Report of Activities – Year 3)

Introduction

This report contains a presentation of the main results of the research work developed by the INCT-FCx in its third year of existence. There are also three appendices:

Annex I – scientific publications, invited presentations in scientific meetings, participation in scientific meetings, training of personnel (complete work), training of personnel (work in progress)., chapters of books, patents, and prizes.
Annex II – teaching activities, dissemination of science, updating courses, research Summer School.
Annex III – program and report of the Evaluation Meeting of the INCT-FCx, and program of the Workshop on lipoproteins that was held in 2011.

The steering committee

Composition

Prof. Dr. Antônio Martins Figueiredo Neto (Coordinator)
Prof. Dr. Luis Juliano Neto (Vice-Coordinator)
Prof. Dr. Francisco Antonio Helfenstein Fonseca
Profa. Dra. Iolanda Midea Cuccovia
Profa. Dra. Lia Queiroz do Amaral
Prof. Dr. Luiz Roberto Evangelista
Prof. Dr. Niels Olsen Saraiva Camara
Prof. Dr. Sylvio Roberto Accioly Canuto

The Steering Committee keeps close contact electronically, and had three presential meetings described in the following paragraphs:

1) **1st October 2011 at São Roque (SP)**

In this meeting the following items were discussed: a) the organization of the Summer School 2012 – from February 6 to 10; b) distribution of the funds among groups and researchers of the INVT; c) planning of a workshop on LDL

2) **28 February 2012 at IFUSP**

Discussions; a) the elaboration of the report of the third year of the INCT; b) activities of teaching and dissemination of science; c) application for additional funds to support the INCT activities during the following two years.

3) **15 March 2012 at IFUSP**

We discussed the responsibilities to prepare the report, which should give emphasis to collaborations coming from the activities at the INCT, and the completion of the application for additional funds.

Main results from the research activities

Topic of research: Liquid Crystals

The investigative sector of the FCX-INCT that deals with liquid crystals obtained results that are relevant to several areas where the Institute is a pioneer in Brazil and occupies a prominent position in the international arena.

In the case of lyotropic liquid crystals, the study of biaxial phases was carried forward from the experimental point of view, by techniques of optical conoscopy, with the investigation of reentrant discotic nematic phases. Furthermore, the refractive indices of the system sodium dodecyl sulfate (SDS) / water/decanol, in the region of coexistence the cylindrical and discotic nematic phases, and also in the biaxial island, were measured in collaborative work facilitated by the INCT, involving researchers from Maringá (Palangana AJ Oliveira and DA) and IFUSP (Q Lia Amaral). The biaxial phase was also the subject of theoretical approaches (S. Salinas and V.B. Henriques) to investigate the phase diagram of a lattice model for a binary mixture based on the Bethe lattice. In the same direction, two new approaches based on the original model of Maier- Saupe have been proposed: in one of them, the biaxial phase is investigated in a system formed by a mixture of discs and cylinders; in the other, the elastic properties of a nematic elastomer are the object of interest. Liquid-crystalline cellulose elastomers were also investigated in order to determine the elastic response of freely supported anisotropic fluids, in na experimental investigation of the group of complex fluids IFUSP (AM Figueiredo Neto and Oliveira CLP) with Portuguese collaborators at the University of New Lisbon, Portugal.

A new domestic collaboration emerged from the study of the dynamics of relaxation of elastomers and thermotropic liquid crystals by means of spectroscopy techniques involving groups of photocorrelation at UFAL (I.N. Oliveira) and IFUSP (A.M. Figueiredo Neto). The members of the INVT at IF-UFAL completed the installation of Laboratory of Anisotropic Liquids and Polymers for the study of viscoelastic and nonlinear optics properties of liquid crystals and polymers. The installation of this laboratory was possible with funds from the INCT (60%); it has experimental setups to use the techniques of photocorrelation spectroscopy, and Z-scanning interpherometry. It is still in the process of installation a Laboratory of Atomic and Molecular Physics that was created to meet the demands for more studies on the effects of solvation on the spectroscopic properties of organic compounds. Although it has not received funds from the INCT-Complex Fluids, the creation of this laboratory is the result of the interaction of researchers from the IF/UFAL and IFUSP. The consolidation and expansion of lines of research related to complex fluids at the Institute of Physics at UFAL is an important result of the INCT of Complex Fluids, since it promoted the decentralization of activities, as the transfer of knowledge. It is worth noting that in the period 2009 to 2011 (period of activity INCT-FCX), the Graduate Program in Physics at IF/UFAL was upgraded to level 5. Among the factors that contributed to this evaluation, it was pointed out by CAPES the creation of new laboratories and the extension of the lines of research.

Techniques of nonlinear optics have been used to study the detailed nature of the nematic-isotropic phase transition in a thermotropic liquid crystal in a collaboration involving researchers from IFUSP (S. Salinas and A.M. Figueiredo Neto) with the group of complex fluids at UEPG (S.L. Gómez) and at UFSC (I.H. Bechtold), which is a new partnership initiated at the INCT. These techniques were also important in the study of nonlinear optical properties of liquid crystals doped with azo-dyes made in the context of a cooperation between IFUSP (A.M. Figueiredo Neto and Sarah I. P. Monteiro) and UFAL (I.N. Oliveira).

From a theoretical standpoint, the diffraction of light by topological defects in liquid crystals was studied taking into account that the propagation of light in the vicinity of these defects seems to present a metric equivalent to the spatial element of the geometry of the global monopole and the cosmic strings, on the other hand, the effects of rotation of an electric field on the dynamics of lattice defects (disclinations) in liquid crystals in two dimensions, were investigated by means of a software developed by the group at João Pessoa (F. Moraes), in collaboration with Portuguese researchers from University of Porto. The computational facilities that allowed the development of this work were provided by the INCT.

A study involving a collaboration between EMU-UEL (A.J. Palangana and M. Simões) and UTFPR (S. Domiciano and F.S. Alves) used the Onsager reciprocal relationship to show that the Miesowicz coefficients of a nematic liquid crystal are not independent, but are connected by means of the effective geometry of the molecules molecules (thermotropic) or the micelles (lyotropic) during a random process of vibration. Research involving computer simulations (Monte Carlo) of cell and hybrid nematic topological defects were incorporated into the expertise of the INCT through collaboration between UEM (L.R. Evangelista) and the University of Bologna (Italy). With respect to research on impedance spectroscopy, we point out some new results, obtained by the group of UEM (P.R. Garcia Fernandez, H. Mukai, L.R. Evangelista), with the pioneering use of fractional calculus, from the investigation of the role anomalous diffusion and memory effects on the electrical response of electrolytic cells. The important role of anomalous diffusion in this context has been tested with the analysis of experimental results of liquid crystals under collaboration between UEM (L.R. Evangelista) and researchers at the University of Calabria (Italy).

Topic of Research: Magnetic colloids

Regarding the study of magnetic fluids, in the last year we have been proposed new routes for synthesis of ferrofluids covering all types: ionic (anionic and cationic), surfacted (for saturated and unsaturated fatty acids of different atomic weights) and suspended in water, alcohols and oils (mineral and vegetable), with the beginning of a possible medical application in cholesterol-based micelles (under the leadership of G. Brito, at IFUSP). On the other hand, this group has developed the hydrophilic nanoparticle hydroxyapatite (HA) in the form of paste and gel. This material is used as osteoconductive, and was implanted subcutaneously in rats (between the skin and muscle tissue in the lumbar region) for biocompatibility tests. In samples collected from seven to forty days after euthanasia of the animals, histological studies were performed in the region where the material was implanted. Surprisingly, the material collected after forty days was totally absorbed by the animal, which leads to the possibility of extending its application to several cases of bone defects and problems. The experiment well be repeated with this material, but this time the HA particles will be marked with magnetite nanoparticles in ionic form in aqueous ferrofluid. This procedure will follow the fate of HA in vivo in rats, using magnetic resonance imaging. Depending on the results, this innovative material may be used as osteoconductive in fractures and serious injuries by reducing the recovery time of injured patients. These processes are under patent study between the Hospital of Rehabilitation of Craniofacial Anomalies (FOBUSP) and IFUSP, because the Hospital intends to deploy this material in view of its unique and innovative properties.

From these results, there was direct contact with the company Biotec - Hospital Products of Mairiporã (CNPJ: 07.204.591/0001-68 State Registration: 433 097 131 111) so that it has been possible to present some of the technology developed in recent years with the research in magnetic fluids. This and other companies showed great interest in materials

with biological applications. In particular, along with Biotec, INCT is developing a draft of a proposal to be presented at IFUSP. Biotec develops its own patent for dressings to be used in bedsore patients with long periods in intensive care units. Under the INCT, IFUSP researchers use nanoparticles of metallic silver in different polymers, as part of these dressings. This same group is holding contacts with suppliers of hospital and dental material for the application of a low cost paste based on HA, and also of magnetic ferrofluids.

In a more focused direction for clinical research, the group of INCT at the Albert Einstein Hospital, under the leadership of L. Gamarra, is also developing new multimodal nanoparticles for use in mapping of labeled cells and the checking of this marking by fluorescence techniques. A study of the influence of the coverage of nanoparticles in the quantification of magnetic nanoparticles through the technique of Magnetic Resonance Imaging (MRI) has been systematically carried out. This study allows to quantify, ie, to investigate the different sizes of magnetic nanoparticles in cell labeling. With a similar purpose, computer simulations were performed to check the stability of magnetic nanoparticles for the intracellular labeling process.

Studies of the temporal evolution of the tumor in the animal model of glioblastoma tumor were performed using the MRI technique, as part of the development of hyperthermia magnetic therapy applied to tumors of the central nervous system. As part of this research strategy, we are still working in the immunophenotypic and ultrastructural characterization of tumor cells of multiform glioblastome. In this direction, a study was conducted by monitoring magnetic resonance imaging of tumor growth in C6 glioblastoma model in rats, always with the prospect of evaluating the effects of the magnetic hyperthermia therapy. Of particular relevance is the review work, "Application of magnetic hyperthermia technique in glioma treatment: A review", which was published in the International Journal of Nanomedicine (6: 1-16, 2011), attesting to the global leadership of our team in this context.

There is work in progress, with a slightly different clinical approach, to study the therapeutic effects of human mesenchymal stem cells from the umbilical cord, labeled with nanoparticles of iron oxide, in the animal model of focal cerebral ischemia, as part of the development of studies of therapeutic effects of stem cells labeled with nanobioparticulate materials. In this direction, we continue the research on mesenchymal stem cells labeled with quantum dots.

In order to familiarize the participants with new strategies for action in the area of nanobiotechnology applied to Medicine, and as a partnership with between the INCT and the Hospital Albert Einstein, we organized the I School advanced in Nanobiotechnology, from 21 to 26 February, in Sao Paulo, as it has been mentioned in the last year report, and whose positive developments were felt during this the past year activities of the INCT.

Finally, it was of great importance to the activities of INCT the granting of the international patent (United States and Japan), by L. F. Gamarra (INCT) et al. (Method for Isolating exosomes from biological solutions using oxide nanoparticles, PCT WO201021335), which refers to the development of a method for the isolation of exosomes from biological solutions by using iron oxide nanoparticles.

Still in the context of the research of the INCT involving magnetic fluids and particles suspended in isotropic and anisotropic media, several significant results were obtained in this third year of activities. Recent research done at IFUSP (A.M. Figueiredo Neto) and Diadema-UNIFESP (S. Alves), in collaboration with researchers from USP in São Carlos, focused on the optical absorption of magnetic colloids, in the time range from thermal to electronic scales, by measurements of the absorption cross section of free carriers. It was thus possible to determine the cross section of free carriers using a technique of nonlinear optics which is part of the capabilities of the INCT, the Z-scanning technique (Z-scan). It was shown that in the particular case of the type of magnetic colloid investigated, the magnitude of this cross section can be obtained both in experiments with pulsed laser beams, on a scale of picoseconds, and experiments in the range of milliseconds.

Development of apparatus for the study of instabilities in ferrofluids and vibrating granular materials, in addition to the analysis of fluorescence optical microscopy to study the dynamics of phase transitions in giant lipid vesicles, are among the main results of the Laboratory for Soft Matter, School of Arts , Sciences and Humanities, USP (A. Tufaile and A.P.B. Tufaile).

Another type of investigation (carried out at IFUSP under the leadership of A.M. Figueiredo Neto), taking into account that the medium in which the particles are diluted is a lyotropic liquid crystal, emphasizes the magnetic behavior of magnetite particles (of a typical dimension of 10 nm). Doping two types of liquid crystals (a binary and a ternary mixture) with particles of ferrofluids, and after characterization of these nanoparticles, it was established that the magnetic nanoparticles show an irreversible behavior at room temperature, in contrast to the behavior when the medium in which they are suspended is a usual liquid (or we are using non micellar mixtures). In this system, the magnetization behaves according to the order parameter of the dichotic phase, and this can be explained by means of a mechanical coupling between the micelles and the nanoparticles, as it can be checked by a Monte Carlo simulation.

The elastic response of an elastomer is also sensitive to the presence of nanoparticles, as shown in joint study at IFUSP (A.M. Figueiredo Neto) and at the New University of Lisbon. Investigated elastomeric films suspended freely with the addition of ferromagnetic particles were studied by a number of techniques (X-ray diffraction, nuclear magnetic resonance, Atomic Force Microscopy, mechanical tests, etc.). It was found that, in the doped samples, the structure remained practically unchanged, although there were changes of ordering of the local order parameter, as shown by observations of micrometric clusters even when the concentration of magnetic particles was small.

The group at UFPE, led by J. A. Miranda, has continued a program of study of ferrofluids and their properties and effects on the environment medium. Besides the pioneering study of inertial effects in problems of pattern formation in confined fluids and adhesion problems, the development of control techniques of interface morphologies of fluid motion on curved surfaces, the sophisticated numerical description using the phase- field method for confined fluids in rotation, we developed a theoretical study of nonlinear dynamics of ferrofluids in Hele-Shaw cells. In this context, it is worth mentioning that the work “Diffuse interface approach to rotating Hele-Shaw flows” was selected to appear in the section KALEIDOSCOPE of Physical Review E, in its edition of October 2011 (online access to which can be done by via the link http://pre.aps.org/kaleidoscope/pre/84/4/046302).

The technique of optical transmittance was used by the group of UEM (P.R.G. Fernandes, H. Mukai and L.R. Evangelista) to study ternary mixtures of water, glycerin and ferrofluids, subjecting the samples to pulsed magnetic fields, and analyzing them between crossed polarizers. The study of this process identified the need to invoke an anomalous non-exponential decay of the short response time of the system of magnetic particles.

The effects of ions dispersed in isotropic and anisotropic media or in electrolytic cells is also a strong topic of research activity at the INCT. Recently, in a collaboration between IFUSP (A.M. Figueiredo Neto) and researchers from Italy, there was an investigation of the influence of ionic adsorption phenomenon on the impedance spectroscopy in a typical electrolytic cell. It has been shown that, if the energies of adsorption are different in the surfaces of the sample, there is an additional plateau in the real part of the electrical impedance as it is displayed as a function of frequency of applied voltage. Concurrently with this behavior, a second minimum occurs in the imaginary part of impedance. To test the proposed model, an electrolyte solution of KCl was investigated in the frequency range from 0.01Hz to 1 kHz.

The group at UEM has also looked at problems in this context. Some of the most important results include an investigation of the electric response of deionized water (P.R.G,

Fernandes, H. Mukai, and E.K. Lenzi - INCT-SC), in collaboration with an Italian group, which pointed out a good agreement between theoretical predictions and experimental results. The theoretical model used in this work is a particular implementation of a more general model, considering a fractional diffusion equation of distributed order, with boundary conditions described by means of a differential-integral equation (E.K. Lenzi and L.R. Evangelista). This is one of the first applications of this diffusion model to the problem of anomalous electrical impedance of a sample in the presence of moving loads and surface effects that cannot be described in terms of an approach that is limited to the nearest electrode blockers. A detailed assessment of the role of anomalous diffusion effects and the effects of working memory is given in the work "Anomalous diffusion and memory effects on the impedance spectroscopy for finite-length situations", made at UEM (L.R. Evangelista and E.K. Lenzi), in collaboration with an Italian and an American researcher, in which the contribution of ions to the electrical impedance of an electrolytic cell is determined analytically. The work was selected by its outstanding quality and timeliness (as noted in http://iopscience.iop.org/0953-8984/23/48/485005 link).

Another highlight achieved by the electrolytic cell research under the INCT are the results obtained by the group of IF-UFRGS, under the leadership of Y. Levin, with the introduction of new theoretical approaches to study these cells in the presence of long-range forces, as in plasmas and gravitational systems. Of particular relevance are the three recent studies published by this group in Physical Review Letters, in which theories with weak and strong couplings are analyzed for colloids and nanoparticles, as well as effects of dielectric discontinuities on the distribution of counter ions, and effects of ionic specificity are analyzed for a colloidal suspension.

Topic of Research: Lipids and Biological Interactions

The INCT of Complex Fluids also aims at demonstrating the biological implications arising from changes, in particular from the oxidation of LDL. These changes are associated with food intake, inflammatory processes, oxidative stress and senescence that are directly associated with various pathologies, including renal and cardiovascular diseases. In this context, we also investigated the quality of LDL in high-performance athletes, selected at the EPM (principal investigators are Francisco A. Fonseca and Maria Cristina Izar). In a population of about 100 athletes, we could observe that the LDL was of good quality, that is, it had a low rate of change under stress. The study also showed that high performance athletes possessed accelerated turnover of endothelial cells, shown by increased number of endothelial progenitor cells. In 2011, ergoespirometric tests were completed, as well as vectotcardiogaphic analysis, electrocardiography and echocardiography, which have indicated interesting features, such as characteristic changes of athletes in all of these laboratory methods.

With these data, our ICNT aims to deepen the study of lipid subfractions by nuclear magnetic resonance, which may reveal new aspects of the distribution of HDL in athletes, and by studies of Z-Scan with qualitative information of the LDL of athletes.

Another fruitful line of research involved studies of Euterpe oleracea (Açaí), which showed multiple anti-atherosclerotic properties. In this experimental study, we found that açaí has, besides the known antioxidant properties, composition with high content of mono and polyunsaturated fats, fiber and phytosterols. We found that açaí reduces levels of total cholesterol and HDL cholesterol, and has no actions that improve the balance of the synthesis and absorption of cholesterol. We observed significant reduction in atherosclerosis in the model of hypercholesterolemic diet in rabbits, as in the figure, where the animals were treated by açaí had a lower degree of development of atherosclerosis in their aortas (panel A) as compared to controls (panel B).

In addition, we performed a population-based survey on the consumption of phytosterols, measuring the content of phytosterols in foods consumed by the population of São Paulo. The study involved interviews of more than 1600 individuals randomly chosen based on the census of 2010. On the basis of food surveys and the subsequent determination of the content of phytosterols in these foods, we found that approximately 1/20 of the daily recommendation of phytosterols that could reduce by 10% cholesterol levels are consumed in São Paulo, with significant impact on the outcomes of atherosclerosis. Once known that inflammatory processes are associated with modifications such as oxidation of LDL, we seek to quantify and to relate these changes with the progression of renal diseases, or with the later stages, close to the need to start therapy. In a cross-section, we evaluated patients with CRD under a traditional treatment, at various stages of this treatment (I to V). Patients were recruited from outpatient clinics of uremia and glomerulonephritis in the Department of Nephrology, Federal University of Sao Paulo. They were between 18 and 75 years of age, and were with CRD of various etiologies. The study excluded patients younger than 18 years old, severely ill or very elderly patients with acute inflammatory symptoms, people with AIDS, diabetes mellitus type 1 and pregnant women. We evaluated 36 patients in the period 2009 to 2011. Of these, 6 patients in stage I, six in stage II, ten in stage III, 4 in stage IV and 8 in stage V. The mean age was 59.3 (± 12.3) years. There was a predominance of males (67%). There was a predominance of Caucasians (58%). Median schooling time was five years. Half of the patients had never smoked, 44% were former smokers and 6% were active smokers. Considering the days that patients were evaluated in the protocol, the median time of follow-up in ambulatory blood urea was 18 months. Regarding the etiology of CRD, 36% were of undetermined cause, 22% had hypertensive nephropathy, 16% had chronic glomerulonephritis, 14% diabetic nephropathy and the other patient had also NICT (2%) and polycystic kidney (2%). There were no significant differences in the proportions of the etiologic diagnosis of CRD among the stages of the disease (p = 0.388). Subsequently, we measured in the serum of patients at different stages the levels of cytokines and chemokines related to the inflammatory process at all stages of CRD. Surprisingly, we found that very early, even when the glomerular filtration rate is not reduced, there is a high concentration of IFN-g and TNF-a and of chemokines (Figure 1).

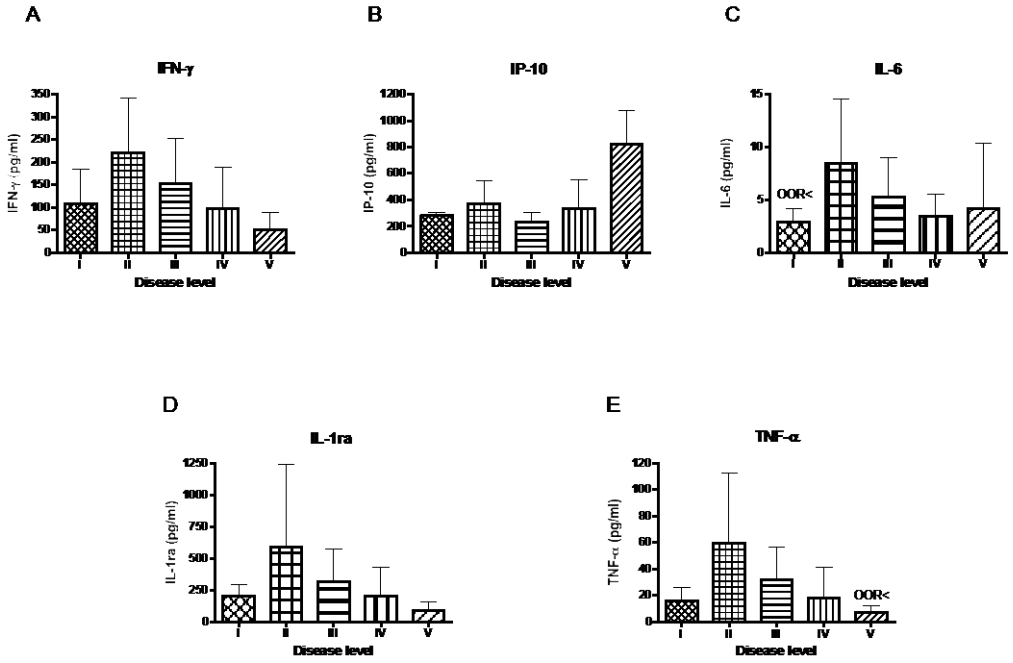


Figure 1 – Protein concentration of (A) INF-g (B) IP-10, (C) IL-6, (D) IL-1ra e (E) TNF-a in the plasma of patients with CRD in traditional treatments and in different stages (I to V). Results are an average of 6 patients in stage I, 6 in stage II, 10 in stage III, 4 in stage IV, and 8 in stage V (± standard deviation).

These data suggest that the inflammatory process is most active in the early stages of progression of the CRD. Once we have demonstrated that the inflammatory profile is detected early, we study the consequences in the oxidative stress. We observed that the level of heme, a protein released during cellular stress, has also peaked in stage 2 CDR, and only later we observed an increase in oxLDL and the formation of reactive dienes (Figure 2). These data show that the CRD is characterized by a systemic inflammatory process that reflects the modification of lipoproteins and the generation of oxidative stress.

In another project, we studied the physicochemical properties of LDL and HDL as cardiometabolic and oxidative markers, and the possible modulation by the consumption of omega-3, omega-6 and omega-9 in patients with intermediate cardiovascular risk. Cardiovascular diseases are the leading cause of morbidity and mortality worldwide, and its prevalence is more accelerated in low and middle income classes. Despite the reduction in the number of deaths after the discovery of statins, approximately 5% of patients develop adverse effects to these medications, which counter-indicate its continued use. In addition, about 30% of individuals using statin remain under moderate or high cardiovascular risk. Therefore, changes in lifestyle, and especially in diet, are an important tool in the modification of the risk and most probably in the prevention of clinic interventions.

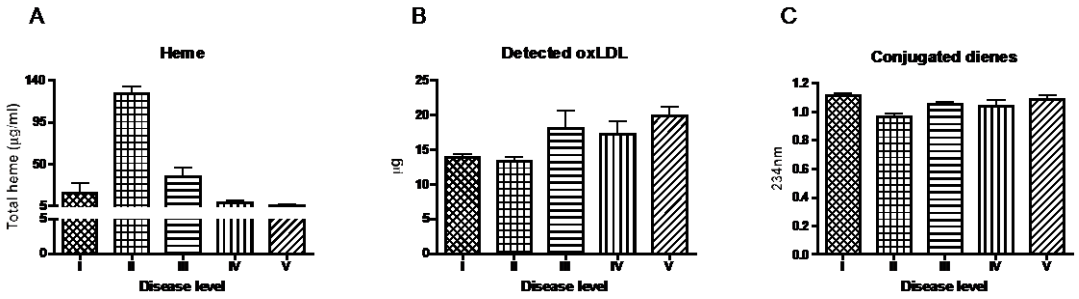


Figure 2 – Evaluation of the presence of products of oxidative stress in the plasma of patients with CRD under traditional treatment and in various stages (I to V). (A) Spectrophotometric detection of toxic heme; (B) Quantification of the oxidation of lipoproteins in the plasma by calorimetric methods; and (C) Detection of the plasma oxidation by the Cooper method. Results present an average of 6 patients in stage I, 6 in stage II, 10 in stage III, 4 in stage IV, and 8 in stage V (± standard deviation).

Accordingly, the use of different fatty acids is potentially interesting as previously documented in the literature. Despite this fact, the simultaneous evaluation of the effect of omega-3 fatty acids, omega-6 and omega-9, on physico-chemical, oxidative and cardiometabolic properties is still poorly explored in the literature and absent in the Brazilian population. Thus, our INCT has been studying the structural modifications of LDL and HDL, as well as in cardiometabolic and oxidative parameters of adults undergoing intervention with omega-3, omega-6 or omega-9. For this purpose, we are recruiting 400 subjects with cardiovascular risk classified according to the Framingham risk score (FRS). These individuals are distributed into two groups: W-3 (n = 100, 6.0 g/d of fish oil), W-6 (n = 100, 6.0 g/d of sunflower oil, a source of omega-6), W-9 (n = 100, 6.0 g/d of olive oil, a source of omega 9) and Placebo (n = 100, 6.0 g/d of gelatin). At the baseline, during 4 to 8 weeks, we will assess the acute effect of interventions on the following parameters: lipid profile and apolipoproteins, LDL and HDL size, fat-soluble antioxidants, oxidation products [LDL(-), anti-LDL(-)], inflammatory markers (PCR and Lp-PLA2), NEFAs, CETP and glucose metabolism (glucose and insulin). We will also monitor the clinical profile, family history of disease, dietary intake, level of physical activity, and anthropometric parameters. Adherence to the intervention will be evaluated using a structured questionnaire and biochemical markers. The development of this study aims at the following goals: Primary - Modification of physicochemical properties of LDL and HDL and of the oxidation and cardiometabolic markers; Secondary - Lipid profile, glucose metabolism, anthropometry and body composition. In this first stage of the study, 257 individuals were included. From the

data obtained, we analyzed blood glucose, lipid profile and calculated the ERF. Initial results show a high prevalence of cardiovascular risk factors (hypertension, dyslipidemia, smoking and low content of cholesterol associated with HDL). This profile was confirmed by calculating ERF samples and in both sexes. Drs. Nagila Damasceno, Magnus Gidlund and A.M. Figueiredo Neto were involved in this project.

The balance between oxidative stress and molecules with endogenous reverse potential is critical to the inflammatory process and therefore leads to changes in LDL particles. This continuous process is not restricted to humans, but present in other animal pathologies, such as infection by the bovine leukemia virus (BLV), one of the most prevalent in cattle. Infection with this virus directly affects milk production. Despite advances in increasing understanding of the pathogenesis of this disease, little is known about the involvement of oxidative stress. Therefore, our INCT has been analyzing the state of oxidative stress and its markers in dairy cows infected with BLV. Our data show that infection has been associated with increased levels of triglycerides, a decrease in the activity of glutathione peroxidase (GSH-Px), and a tendency to lower superoxide dismutase activity in the infected animals. No significant difference was observed in other markers of oxidative stress (that is, conjugated dienes, hydroperoxides and malondialdehyde) in infected animals compared to controls. A major advance of our INCT was obtained by the consolidation of a new method for the analysis of oxidative stress, the technology based on Z-scan, that is, the measurement of the mean value of the low-density lipoprotein. This parameter measures the ability of LDL in solution to form a "thermal lens" in the sample, illuminated with a laser beam of Gaussian profile. We show that this property is directly related to the oxidation state (modification) of LDL. This measurement showed that the infected animals had particles of low density lipoproteins which were modified slightly less than those of the healthy group. Thus, we conclude that BLV infection is associated with a selective decrease in the activity of antioxidants, without any change in the traditional markers of the medication of oxidative stress.

Another important line of research in the INCT uses physico-chemical studies to identify factors related to pathogenic microorganisms. Specifically, the new results obtained by the group showed new virulence factors of enteropathogenic Escherichia coli (EPEC) is atypical. This bacterium is now considered an emerging pathogen in developing countries, among them Brazil. We gave the first description of an antiphagocytic mechanism in atypical EPEC on the basis of a factor secreted by the bacteria. After the purification process, this factor acquires the ability to inhibit the bacteria from adhering to epithelial cells, which is a critical step for the establishment of infection. This discovery opens the possibility of identifying a factor that makes it more difficult the bacterial adhesion to professional and nonprofessional phagocytes. Considering the increasing economic interest in compounds secreted by microorganisms, of medical interest and that can be patented, the identification of factor may be of great importance in the control and prevention of diarrhea caused by this bacterium. Among the toxins, which are important factors of virulence, and which have a role in bacterial infection, we have the autotransported proteins of the Spate family (serine protease autotransporters of the Enterobacteriaceae), consisting of proteins capable of mediating their own transport through the outer membrane. However, its role in the pathogenesis of atypical EPEC had never been described. We have recently described the presence and the cytotoxic of toxins Pet (plasmid encoded toxin) and Sat (secreted autotransported toxin) in atypical EPEC, both members of the SPATE family, which may contribute to the advance the study of the pathogenic mechanism of this bacterium. The group of researchers responsible for this research is coordinated by Dr. Rita Ruiz, Instituto Butantan.

Topic of Research: Membranes

1) Interaction of Lipid Bilayers with Peptides

Antimicrobial peptides are part of the natural defense of plants and animals and exhibit lytic activity against the membrane of microorganisms. These peptides are a promising alternative to known antimicrobial therapies. Our focus is to study the interaction between antimicrobial peptides (synthesized by collaborating groups) and model membranes (lipid bilayers of different compositions) in order to unravel the mechanism of action of these peptides.

The BP100 (KKLFKKILKYL-NH2) is a synthetic peptide and a hybrid of the peptides cecropin and melittin. Besides acting on the membrane of bacteria causing his death, it is not so hemolytic and has high selectivity for negatively charged membranes, which is a characteristic of bacterial membranes.

We studied the interaction of BP100 with large unilamellar vesicles (LUV) prepared with mixtures of phosphatidylcholine (PC) and phosphatidylglycerol (PG) using fluorescence techniques, circular dichroism (CD), electrophoretic mobility, dynamic light scattering (DLS) and optical microscopy (using giant vesicles, GUVs). Our results showed that BP100 permeabilizes LUVs prepared with different mixtures of PC:PG, even at high ionic strength. The presence of negative charge in LUVs significantly increases the activity of the peptide, whereas cholesterol decreases its activity.

The results of the CD experiments showed that, in aqueous medium and in the presence of PC, the BP100 presented a random structure. In the presence of PC:PG vesicles, we observed a typical alpha-helix structure.

It was also shown that the LUVs of PC do not aggregate in the presence of BP100, but the peptide changes its electrophoretic mobility. In LUVs containing PG, however, we observed aggregation and abnormal electrophoretic mobility, confirming the strong binding of BP100 to these vesicles.

The observation of the action of BP100 GUVS prepared with PC and PC:PG showed that the addition of peptide GUVs initially causes an increase in the spontaneous curvature of the membrane due to connection with the outer monolayer, followed by the formation of areas on the surface of vesicles (dark regions in FIG. 1), indicating a possible bending of the membrane-mediated peptide bond. In some cases, the connection to a BP100 also promoted aggregation of GUVs, as commonly seen in dispersions of LUVs. Subsequently, it was more frequently observed a loss of contrast on GUVs of pure POPC, and the explosion of GUVs of POPC, POPC 70:30, similar to that observed for the melittin. This behavior is illustrated in figure 1.

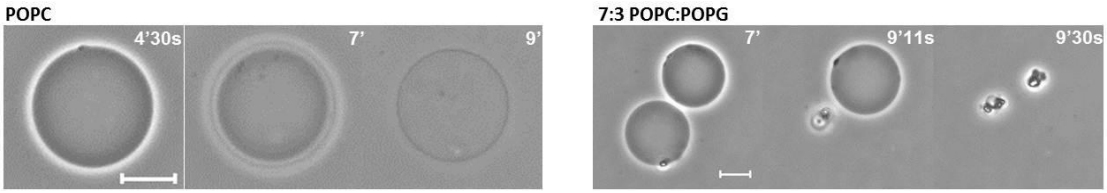


Figure1 – Optical microscopy of a giant vesicle of POPC and of POPC with the addition of 30 Mol% POPG as a solution of BP100 is injected by a micropipette in the neighborhood of the vesicles.

The data set obtained is suggestive that the BP100 acts forming structures similar to pores on the membrane of vesicles, through which there may be an overflow of the internal content. The formation of α-helix structure of BP100 in LUVs containing PG should encourage this pore structure.

2) Interaction of the Antimicrobial Peptide Gomesin and the Structural Analogs with Model Membranes

During 2010, Dr. Karin A. Riske and Dr. Kathy R. Perez continued the studies involving antimicrobial peptide gomesin and its various structural analogues. The main experimental techniques were ITC (isothermal titration calorimetry), light scattering and fluorescence. The technique allows obtaining ITC thermodynamic parameters of the lipid-peptide interaction. This technique gives the heat arising from the interaction between antimicrobial peptides and lipid vesicles. Then, through a model describing the peptide-lipid combination, it is possible to extract the binding constant K and consequently the variations in the Gibbs free energy, ΔG, and entropy, ΔS. The interpretation of experimental data is being made in collaboration with Dr. Joachim Seelig at the University of Basel, Switzerland, the pioneer of the technique of ITC thermodynamic study of the interaction of peptides with membranes. The light scattering measurements were made in order to monitor the aggregation of vesicles promoted by interaction with peptides. The lytic activity of gomesin and its analogues was quantified from experiments of leaking of a fluorescent probe incorporated into the inner compartment of lipid vesicles.

To understand the role of certain specific amino acids in the primary sequence of gomesin, we synthesized analogues, in which these individual amino acids were replaced by alanine, yielding the analogues alax-gm, where x indicates the position of the amino acid replaced by alanine (x = 5, 7 , 9, 10, 12 or 14). The interaction between gomesin and alax-gm with membranes composed of mixtures of neutral lipids (POPC, palmitoyl oleoyl phosphatidylcholine) and anionic (POPG, palmitoyl, oleoyl phosphatidylglycerol) was studied by ITC, light scattering and leakage of the fluorescent probe carboxyfluorescein (CF) previously encapsulated in the internal compartment of the lipid vesicles. Figure 2 gives an illustration of some results obtained with ITC and leakage of gomesin for interaction with membranes. Figure 2a shows the flow of heat as the gomesin is titrated with the lipid vesicles. The heat associated with each peak as a function of the molar ratio lipid:peptide is represented by symbols in Figure 2b. The line represents the fitting obtained by modeling the partition surface combined with the Gouy-Chapman theory. Figure 2c shows the fluorescence intensity versus time obtained for different concentrations of gomesin. The increase in fluorescence is directly related to the percentage of CF leakage of internal contents of the lipid vesicles.

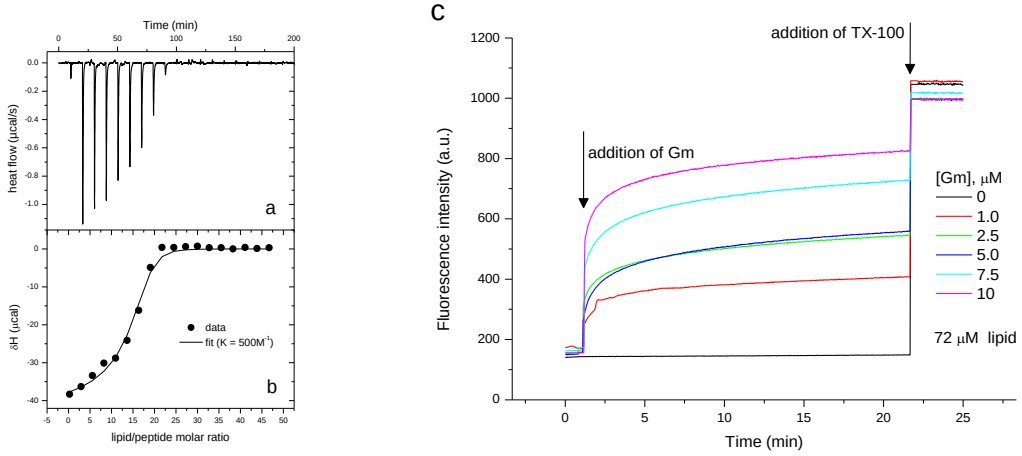


Figure 2 – A) Heat flux as the vesicles of 1:1 POPC:POPG are injected in the calorimetric cell with 15 □M Gomesin. B) Heat associated with each injection (dots) and fitting (line) with the used model. C) Intensity of fluorescence of carboxifluoresceine encapsulated in the interior of the vesicles of 7:3 POPC:POPG after the injection of different concentrations of gomesin. At th end of the experiment, Triton X-100 is added (0.2% Final) for the total

liberation of the encapsulated CF. Results of light scattering and optical microscopy show that these peptides induce a strong aggregation between the lipid vesicles (results are not shown).

3) Morphology of Amphiphilic Systems

The presence of sodium triflate (NATF) at concentrations equal to or greater than 0.05m in aqueous solutions of trimetildodecilamonics triflate (DTATF) leads to a macroscopic phase separation. This phenomenon, which is not usual in ionic micellar systems, may be either the result of the growth of micellar aggregates due to the addition of salt or a phase transition. Rheology measurements showed an increase in viscosity of the system with the concentration, even if it is small, and a decrease of the viscosity with the addition of salt. Therefore, it becomes quite interesting to carry out structural studies of this amphiphile system.

In order to determine the mechanism responsible for this phenomenon, we performed measurements of X-ray scattering at low angles (SAXS) in collaboration with Drs. Lia Q. Amaral and Karin A. Riske, in addition to researchers from IQUSP (Iolanda Cuccovia and Hernan Chaimovich). The SAXS curves obtained were fitted with models of cylindrical and spherical micelles, with indications of micellar growth due to the increasing concentrations of added detergent and salt in the solvent. The results of this work are being written for publication.

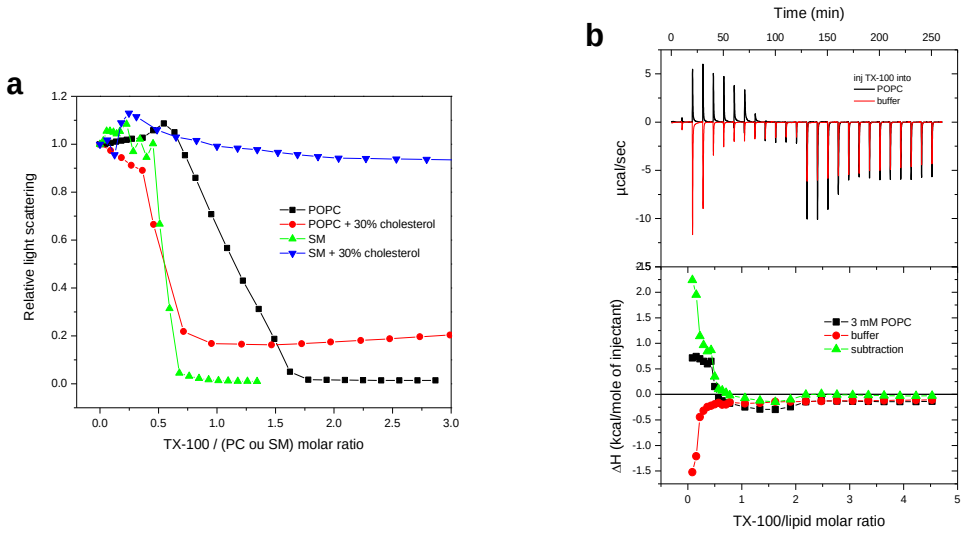
The measurements were performed with different concentrations of DTATF in the absence and presence of NATF (below 0.05m, homogeneous solutions). The first results were modeled by spherical and cylindrical objects, since these are the most common situations in similar systems. However, the two models have shown a poor fitting. Surprisingly, the bilayer model has been shown to describe the observed scattering profile, indicating a flat micelle (possibly, an oblate aggregate).

We have used a model bilayer with two distinct regions, each one having a characteristic size and electronic contrast. One of these regions corresponds to the hydrophobic interior of the bilayer, and the other to the polar interface. In this situation, we set the length of the polar region and the electronic contrast in the interior of the bilayer, which are both defined in the literature. The results indicate that the thickness of the aggregates, the minor semi-axis of an oblate object, does not change with the concentration of surfactant and is also insensitive to salt addition, while the contrast of the polar region E remains unchanged (not shown). The results shown here are of central importance for understanding the system; the observed phase separation is a phase transition, given the small influence of NATF on the radius of the aggregates. Additionally, the system structure can be inferred by adjusting theoretical scattering curves, which points to an unusual form of the cationic micelles.

4) Solubilization of Membranes Containing Sterols

The process of solubilization of biological membranes by detergents is widely used in many biochemical protocols for extraction and purification of membrane proteins. The mechanism of solubilization depends primarily on the interaction of different amphiphilic molecules: lipids, membrane proteins and detergents. Our goal is to study the process of solubilization of lipid bilayers composed of lipids found in abundance in biological membranes in order to understand the physicochemical aspects of the solubilization process and the reasons that lead to resistance to detergent compositions containing lipid of certain sterols (both cholesterol and phytosterols). The first part of the work in progress is the study of solubilization of binary membranes of unsaturated PC, sphingomyelin and cholesterol, using the techniques of ITC (isothermal titration calorimetry), light scattering and optical microscopy. Figure 3 summarizes the main results obtained with these techniques. Figure 3a

shows the light scattering measurements of vesicles of different compositions as we increase the concentration of the injected Triton X-100 detergent. A decrease of light scattering is associated with the process of solubilization of bilayers. Clearly, the sphingomyelin composition with 30 mol% cholesterol is resistant to the solubilization process, since no considerable variations occur in the size of vesicles by increasing the detergent concentration. Figure 3b shows the results of ITC for the process of solubilization of the vesicles of POPC. Measurements with other lipid compositions were also made. Figure 3c illustrates the process of solubilization of a giant vesicles composed of POPC 30 mole% cholesterol. The vesicle initially undergoes morphological changes associated with incorporating triton x-100 primarily in the outer monolayer, and then is solubilized. Later we will study the effect of replacing cholesterol by the plant sterols, phytosterols.



C) POPC:Cholesterol 70:30

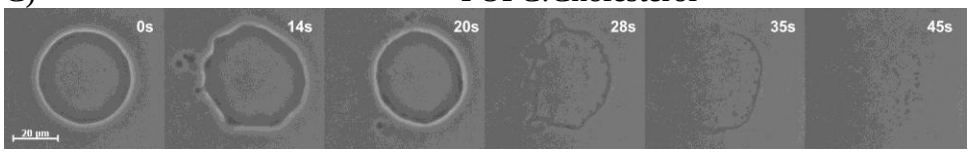


Figura 3 – A) Light scattering of 3 mM of vesicles of different compositions as we add the detergent Triton X-100 in the cell. B) Results of ITC; flux of heat as we add detergent Triton X-100 to the cell, which is filled by 3 mm POPC or closed by a plug. In the bottom, we indicate the heat associated with each injection and the subtraction of the values in the presence or absence of the lipid. C) Optical microscopy of a giant vesicle of POPC with 30 mol% cholesterol as we inject the Triton X-100 detergent by a micropipette in the neighborhood of the vesicle.

5) Effects of Mixtures of charged and zwitterionic lipids on the properties of the vesicles: Size, electrophoretic mobility, and degree of dissociation

Lipid mixtures in part control the fluidity and load of biological membranes, allowing the selective binding and flow of small molecules and macromolecules. We studied the effect on the properties of the vesicles of mixtures of phosphatidylcholine, PC, and some analogs (Dimiristoyl, DMPC, dipalmitoyl, DPPC), with negatively charged lipids (phosphatidylglycerol, PG), and dialkyldimethylammonium chlorides, positively charged (dioctadecyl, DODAC, dihexadecyl, and chloride DHDAC 1,2 - dipalmitoyl-3-trimethylaminepropano, DPTMA). We determined electrophoretic mobilities, U_E, zeta potential, Z, diameters, D, and the degree of dissociation, α, of the vesicles. The vesicles were prepared by extrusion through polycarbonate membranes (1000 Å) had diameters of 900±100 Å. The values of Z and U_E for vesicles with 10-100% of positive lipids in the

mixture were essentially constant (45 Mv and 4.5 Mmcm/Vs, respectively). These values decreased to zero below a 10% load in the vesicles. For mixtures of PG with PC, the absolute values (negative) of U_E and Z were roughly the same as for mixtures of PC with DODAC or DPTMA. The values of α decreased from 0.15 to 1, between 5 and 40% of load, and remained constant above 40%. These results indicate that the values of U_E and Z remain constant with increasing proportion of charged lipids (above 10%), while the values of α decrease regardless of the load of the amphiphiles. This study is done in collaboration by Katia R. Perez, Louise C. Florencio, Maria Catarina F.S.P. Leite, Maria Sofia V. Rocha, Mariana C. Manzine, Marcia A. da Silva, Sallete Kings, Hernan Chaimovich and Iolanda M. Cuccovia.

6) Study of the suppression of the fluorescence of pyrene tetrasulfonatosodium, PTS, by methyl-viologenic chloride, MV, as a function of temperature and ionic strength. A method for determining the permeability of the vesicles in low ionic strength

We determined the association constant of PTS with MV, k_s, in the ground state, by measurements of the visible absorption at zero ionic strength, and obtained a value of about $7x10^4$ m^{-1}. The value of k_s decreases with increasing temperature, reaching $5x10^4$ m^{-1} at a temperature of 40 C. The increase of the ionic strength decreases considerably k_s, by a factor of 100 times between zero added salt and an addition of 300 mm of NaCl. In this system, the suppression of fluorescence of the PTS occurs by a mixed mechanism, static and dynamic. The association constants in the excited and ground state, k* and k_s, were also determined by fluorescence. Values obtained for k_s were very similar as those determined by absorption, and values for k* were about 10 times smaller. The increase in ionic strength led to a decrease of k* by a factor of 10. The use of TPS as a marker of the internal aqueous compartment of liposome and of MV in external enclosure led to the establishment of a new methodology for determining leakage of vesicles at low ionic strength. This work is a collaboration involving Katia Regina Perez, Mariana C. Manzine, Thiago Robin Benz, Mario Jose Politi, and Iolanda M. Cuccovia.

7) Signaling uric acid via Myd88 affects the balance Th1/Th2 balance in the development of renal fibrosis

Currently, chronic kidney disease (CKD) is considered an inflammatory disease. Molecules released by injured inflamed tissue may activate receptors "Toll-Like" (Tlrs), as well as modulate the activity of macrophages and T cd4+. In this work, we propose that uric acid, released in an experimental model of CKD, stimulates the MyD88 signaling pathway activation of Tlr and leads to a biased immune response towards Th2 and the formation of fibrosis.

Mice that underwent a unilateral urethral obstruction (UUO) had an increase in macrophage infiltration, with an increase of regulation of the inflammatory markers in combination with the deposition of collagen after 7 days. Moreover, mice genetically modified not to express TLR2, TLR4 MyD88, showed a decrease in the release of uric acid and a decrease in the formation of fibrosis, with an improvement of renal function, which comes together with a decrease in the production of Th2 cytosine. The absence of IL4 in hematopoietic cells was associated with improved renal function, decreased levels of IL13 and TGF-B, reduced arginase activity and consequently a decrease in the formation of fibrosis in the UUO model. The experimental depletion of macrophages indicates that mice showed an improvement in renal function and a decrease in collagen deposition, which is better than presented in the absence of T cells. In vitro studies showed that MyD88-deficient macrophages expressed less cytokines related to pro-fibrotic inflamassomes as they are stimulated with uric acid crystals. These results suggest that fibrosis is mediated in part by a biased response to Th2 that triggers a mechanism of tissue damage. This work is a

collaboration involving Niels Olsen Saraiva Camara, Katia R. Perez, and Iolanda M. Cuccovia.

8. Detailed Modeling of X Ray Scattering

Results obtained with X-ray scattering require detailed modeling for their interpretation. In 2011 advances were obtained in specific cases of interpretation of results in membranes and amphiphile aggregates. Dermatological emulsions, with amphiphiles, water and natural oils, are being studied in a collaboration of dra. Lia Q. Amaral with the group of prof. Pedro Rocha Filho (FCF-RP-USP), initiated through INCT, and have both applied and academic interest. The X-ray results showed that at room temperature, of practical interest for the creams, the system is in a gel phase (extended hydrocarbon chains), preventing de-hydration. Detailed modeling of SAXS of aggregates with several forms and several levels of electron density are being performed in a collaboration of Dra. L.Q. Amaral with Dr. Francesco Spinozzi, from Ancona, Italy, specialist in simulations. Besides ongoing work in phospholipid membranes, dr. Francesco has passed to Dra. Karin Riske the program he developed, allowing a better and deeper analysis of results obtained in several types of aggregates within the INCT project, including those mentioned in the item 3. Morphology of Amphiphilic Systems.

Research work of the theoreticians and their interactions

The theoreticians of the INCT-FCx obtained some relevant results in several areas of the proposal, especially in the study of properties of molecular and stochastic model systems.

In the area of molecular properties, we point out a number of results, some of them involving collaborations between different groups. Researchers at UFRGS (Y. Levin and M. Barbosa) obtained results for the description of the interface between electrolytes and air, and for studies of confined water in models related to gene therapy (which is a collaboration with O. Nassif from UFMG). At IFUSP, K. Coutinho and S. Canuto obtained results for the description of solvent effects in electronic absorption spectra and NMR molecular models, in collaboration with M. Lyra, from UFAL, which is another example of a collaborations initiated at the INCT. Also, the IFUSP group collaborated with H. Stassen, from UFRGS, to describe the important of polarization of fluorescent probes and its consequences in interactions with phospholipid bilayers.

Simulations, experiments and existing theories are not able to provide a consistent description of the interface between the electrolyte and air. Recently, we developed a new theory that allows the explicit calculation of the density profile of ions, the surface tension and the potential across the interface between air and water. The theory takes into account both the hydration and ionic polarizability. The theoretical predictions are compared with experiments and are in excellent agreement. The theory can also be used to explain the stability of hydrophobic colloidal suspensions, casting new light on one of the Hofmeister effect, which is one of the oldest puzzles of physical chemistry.

Confined water is present in all biological systems. Therefore, it is important to calculate its thermodynamic and dynamic properties, and in particular the anomalies that are known to occur in confined and unconfined water. We constructed a series of effective models to describe the anomalies of water, such as the anomaly of density and diffusion. We have found that these effective models are able to reproduce the experimental and simulation results. Water under confinement in a nanotube display an increase of the diffusion coefficient as we decrease the radius of the tube. This is a behavior that does not occur in normal fluids, and has a number of potential applications in biological and industrial systems.

In the studies of gene therapy, we found that there is a packing of a system if we associate small quantities of cyclodextrin with the DNA of the system. If we increase the amount of cyclodextrin, the system begins to stretch and, if we reach a certain limit, the system breaks down. This result is in agreement with experiments and helped us to understand the interactions that dominate the complexation of cyclodextrin-DNA.

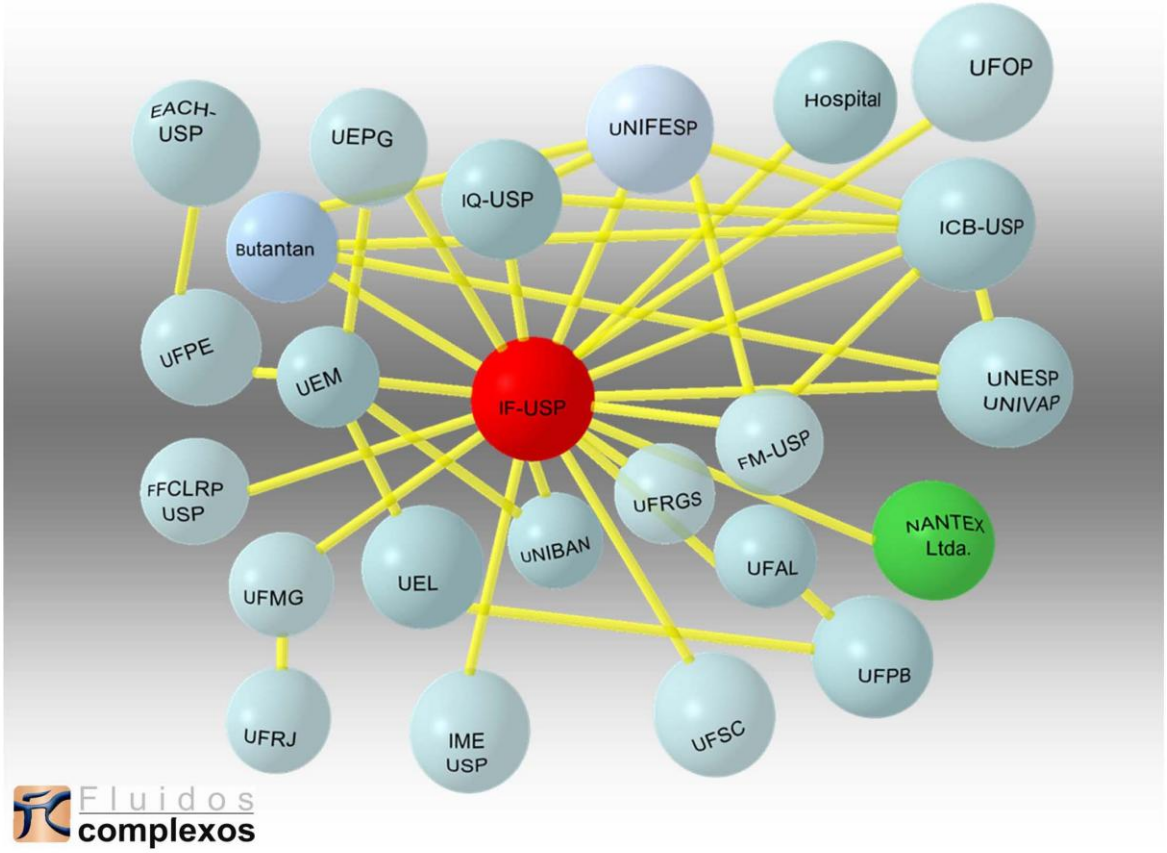
In studies of effects of solvents on electronic absorption spectra and NMR, we used diazines as a model system, and were able to use the computer simulations for the solute-solvent system to show that the presence of the solvent is crucial for the correct description of the electronic properties of the solute. We concluded also that the electronic spectrum is a property susceptible to be affected by the environment. It is therefore, strictly necessary to include the solvent molecules that form hydrogen bonds and a long-range electrostatic field. In NMR, on the other hand, the chemical shift is a local property that is not very susceptible to hydrogen bonding, and may not be explicitly included in the model calculations. In studies of fluorescent probes, we found that the polarization effect is even more important, and it is crucial to identify its insertion and positioning in model lipid bilayers.

The researchers at UFAL (I.N. de Oliveira and M.L. Lyra) have developed a theoretical study of phase transitions in smectic films. In particular, we investigated the presence of an external electric field that may induce a reduction of the transition layer of the smectic films suspended from compounds with a negative dielectric anisotropy. This work opens the possibility for the strict control of the thickness of liquid-crystalline films at the nanometer scale, as required in various optoelectronic devices. Also, within the context of phase transitions in freely suspended smectic films, we investigated how the interplay between surface and finite-size effects changes the phase diagrams of these systems. Another problem studied at UFAL was the nature of the elastic deformations in free smectic films that can induce long-range interactions between adsorbed nanoparticles. This work, in collaboration with F. Moraes, form UFPB, lead to the identification of a potential interaction between the nanoparticles, with a logarithmic decay with distance. The study of the effects of the presence of nanoparticles in liquid-crystal samples was the subject of an international collaboration with Professor Leonid V. Mirantsev from the Academy of Sciences of Russia. With the use of the methods of molecular dynamics, we have been able to determine that the inclusion of nanoparticles enhances the transition temperature between isotropic and ferroelectric nematic phases. Also, in another type of study, we have considered the propagation of electromagnetic waves in cholesteric liquid crystals containing defects. We then show that it is possible to induce the formation of resonant modes in the forbidden bandwidth of these materials, and generate multiple bands in the red, green and blue (RGB) regions of the spectrum. These results may contribute to the development of new electro-optical devices based on cholesteric liquid crystals, such as digital displays without backlight, low-threshold lasers sources of activation, and optical switching.

At the IFUSP, S. Salinas and A. M. Figueiredo Neto, in collaboration with S. L. Gómez from the UEPG, used elementary statistical models suggested by the Maier-Saupe theory to explain certain aspects of the nematic transition.

Matrix of Collaborations

We now present the relationships of collaboration among the different institutions of the INCT-FCx. We represent in red the headquarters of the INCT, and in green a company that has been incorporated to the proposal. The only alteration during the period of this report was the incorporation of another company, Biotec-Produtos Hospitalares, which is also connected to IFUSP, so there is another green sphere connected to the headquarters.



(INCT-FCx) - Annex I
Scientific publications

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Invited presentations at scientific meetings

1. “Elementary lattice models for the nematic transition in anisotropic liquid mixtures”, “Perspective and challenges in statistical physics and complex systems for the next decade: A conference in honor of Eugene Stanley and Liacir Lucena”, Natal, RN, Brasil, 9 to 11 November 2011. Silvio Salinas.
2. 6th International Elastomer Liquid Crystal Conference. “Optical and mechanical characterization of crosslinked (acetoxypropyl) cellulose films under uniaxial strain”. 2 to 11 September 2011, Lisboa, Portugal. Antônio Martins Figueiredo Neto.
3. 9th International Congress on Coronary Artery Disease. “Identification of modifield LDL particles by using the Z-scan physical tecnique”, 21 to 29 October 2011, Venice, Italy. Antônio Martins Figueiredo Neto.
4. Conferences of the Program for the Improvement of Teaching at IME-USP, talk on “Using a database to teach statistics”, 3 June 2011. Viviana Giampaoli

5. Dynamical and structural anomalies in water, VI Brazilian Meeting on Computational Physics, Pantanal, Brasil, August 2011. Marcia Barbosa.
6. National Meeting of Physics 2011. Cu and Fe metallic ions-mediated oxidation of lyotropic-like low-density lipoproteins studied by NMR, TEM and Z-scan Technique”, 5 to 10 June 2011, Foz do Iguaçu, Paraná. Antônio Martins Figueiredo Neto.
7. National Meeting of Physics 2011. “Enhancement of the nonlinear optical absorption of E7 liquid crystal at the nematic-isotropic transition”, 5 to 10 June 2011, Foz do Iguaçu, Paraná. Antônio Martins Figueiredo Neto.
8. National Meeting of Physics 2011. “Impedance measurements in pure water”, 5 to 10 June, 2011, Foz do Iguaçu, Paraná. Antônio Martins Figueiredo Neto.
9. National Meeting of Physics 2011. “LDL quantification protocol using Europium-chlortetracycline complex”, 5 to 10 June, Foz do Iguaçu, Paraná. Antônio Martins Figueiredo Neto.
10. National Meeting of Physics 2011. “Relation between LDL absorbance and z-scan technique signal”, 5 to 10 June 2011, Foz do Iguaçu, Paraná. Antônio Martins Figueiredo Neto.
11. National Meeting of Physics 2011. “Structural, optical and mechanical characterization of flexible acetoxypropylcellulose (APC) derived films”, 5 to 10 June, 2011, Foz do Iguaçu, Paraná. Antônio Martins Figueiredo Neto.
12. National Meeting of Physics 2011. “Study of the nonlinear optical response of LDL in periodontal treatment” , 5 to 10 June 2011, Foz do Iguaçu, Paraná. Antônio Martins Figueiredo Neto.
13. National Meeting of Physics 2011. “Use of Thioflavin T and Europium-Chlortetracycline as fluorescent marker for LDL oxidation“, 5 to 10 June 2011, Foz do Iguaçu, Paraná. Antônio Martins Figueiredo Neto.
14. National Meeting of Physics 2011. “Virtual tricritical behavior at the nematic-isotropic transition in the E7 liquid crystal“, 5 to 10 June, 2011, Foz do Iguaçu, Paraná. Antônio Martins Figueiredo Neto.
15. National Meeting of Physics 2011. Entropy production in systems described by master equations, Mário José de Oliveira e Tânia Tomé, June 2011, Foz do Iguaçu.

16. Entropy, diffusivity and the energy landscape of a water-like fluid, National Meeting of Physics 2011, Foz de Iguaçu, Paraná, June 2011. Marcia C. Barbosa Alan Barros de Oliveira, Evy Salcedo Torres and Charusita Chakravarty.
17. I-CAMP'11 School. “The Z-Scan technique applied to investigate optical properties of complex fluids”, 27 to 30 May, 2011, Montevideo, Uruguai. Antônio Martins Figueiredo Neto.

18. II Workshop on Complex Physical Phenomena in Materials. “Structural characterization of liquid crystalline cellulosic networks”, 31 January to 3 February, 2012, Porto de Galinhas, PE
19. Investigating protein-surfactant complexes using small angle X-Ray scattering, Oliveira CLP el al, poster presentation, 22 to 23 April, 2011, 21st Annual Meeting of the Users of the LNLS.
20. Investigating structure and dynamics of flexible particles in solution, Oliveira CLP, seminar at the group of statistical physics, IFUSP, 29/03/2011.
21. Ion Specific Effects at Interfaces, American Chemical Society, March Meeting, Boston, EUA, February (2012). Y. Levin.
22. Ions at Air-Water Interface: Surface Tensions and Surface Potentials of Electrolyte Solutions, 8th Liquid Matter Conference, Vienna, Austria, September (2011). Yan Levin
23. IV Workshop of Post-graduation in Physics, 25 to 28 July, 2011, Institute of Physics of the Federal University of Alagoas, Maceió, Alagoas. Antônio Martins Figueiredo Neto.
24. Liquid crystal phase and waterlike anomalies in a core-softened shoulder-dumbbells system, poster presentation at the “8th Liquid Matter Conference 2011”, Vienna, Austria, September 2011. Marcia C. Barbosa.
25. Magnetic nanoparticles studied by Small Angle X-ray Scattering, Oliveira CLP et al, poster presentation at
26. Nonequilibrium lattice models with Boltzmann-Gibbs probability distribution, Mário J. de Oliveira, Workshop on Complex Systems: Social and Biological Applications, December 2011, São Paulo, SP.
27. Moscow International Symposium on Magnetism. “Nonlinear absorption of surfacted ferrofluid investigated whit the Z-Scan technique”, 18 to 27 August 2011, Moscow, Russia. Antônio Martins Figueiredo Neto.
28. Protein-Surfactants complexes using Small Angle X-Ray Scattering, Oliveira CLP et al., oral presentation, National Meeting of Physics, Foz do Iguaçu, 5 to 10 June, 2011.
29. SPIE Photonics West "Emerging Liquid Crystal Technologies VI", 21 to 31 January, 2011, San Francisco, California. Antônio Martins Figueiredo Neto.
30. Stochastic modeling for interacting population biology, Tânia Tomé, Workshop on Complex Systems: Social and Biological Applications, December, 2011, São Paulo, SP.

31. Structural Investigations of Soft Matter, oral presentation for the students of the ESPCA2011 (São Paulo School of Advanced Science), University Council Hall, USP. Oliveira CLP, 26/01/2011.
32. Thermodynamic, dynamic and structural anomalies in models for liquid water, invited talk at the conference Perspectives and Challenges in Statistical Physics and Complex Systems for the Next Decade: A Conference in Honor of Eugene Stanley and Liacir Lucena, Natal, Rio Grande do Norte, November, 2011. Marcia Barbosa.
33. Thermodynamic, dynamic and structural anomalies in models for liquid water, invited talk at the conference Recent Developments in Computer Simulation Studies in Condensed Matter Physics, Athens, Georgia, USA, February, 2012. Marcia Barbosa.
34. Thermodynamic, dynamic and structural anomalies in models for liquid water, invited talk at the Workshop on structure and dynamics in supercooled, glassy and nanoconfined fluids, Buenos Aires, Argentina, May, 2012. Marcia Barbosa.

35. Un método de selección del número de grupos utilizando entropia", Facultad de Matemática, Astronomia y Física, Universidad Nacional de Córdoba, 11 October 2011. Viviana Giampaoli.

36. XXXIX Coloquio Argentino de Estadística. Oral presentation, "Modelos logísticos mutiniveles: propuesta para la estimación y predicción", 12 to 14 October, 2011. Viviana Giampaoli.

Participation in scientific meetings

1. "Development of a Two-Dimensional Detector for X-Ray Experiments", Cássio Alves, Cristiano Luis Pinto de Oliveira.
2. "Simulation and Modeling of Small Angle Scattering Intensities", Cassio Alves, Cristiano Luis Pinto Oliveira.
3. 23rd International Symposium on Pharmaceutical and Biomedical Analysis. Isis Arvati, Gilvan Leonardo, Durvanei Augusto Maria, Claudete J. Valduga. Pharmacokinetic and metabolites analysis of sodium 4-[5-(4-hydroxy-3-methoxyphenyl)-3-oxo-penta-1,4-dienyl]-2-methoxy-phenolate in mice. (PBA 2011).
4. 28th Annual Meeting of the Brazilian Odontological Research Society, Tera, T.M. ; Meyer, A.C.A. ; Nascimento, R.D. ; Prado, R. F. ; Jardini, M. A. N. . A interação RANK/RANKL/OPG no reparo de enxertos ósseos autógenos em bloco em ratas com deficiência estrogênica. Águas de Lindóia. Braz Oral Res, 2011. v. 25. p. 227-58.
5. 34th Annual Meeting of the Brazilian Chemical Society. José J. G. Bittencourt, Maria A. Santos, Ana S. Marques, Bruno C. Guerrieri, Claudete J. Valduga. Propriedades físico-químicas de uma nanoemulsão lipídica contendo miltefosine para tratamento da leishmaniose, **Florianópolis, SC,** 2011.
6. 34th Annual Meeting of the Brazilian Chemical Society. Maria A. Santos, Oseraldo V. Rocha, Susana Dinis, Ítalo Adelk, Claudete J. Valduga. Uso de nanoemulsão baseada em lipídeos como veículo para a 1,5-bis(4-oleil-3-metoxifenil)-penta-1,4-dien-3-ona, **Florianópolis, SC,** 2011.
7. 45th Brazilian Congress of Clinical Pathology, 2011, Florianópolis. Efavirens vs nevirapine: impact on serum ferritin concentration in HIV-1-infected. Cunha, J. ; Maselli, L. M. F. ; Levy, D. ; Spada, C. ; Bydlowski, S. P.. Jornal Brasileiro de Patologia e Medicina Laboratorial, 2011. v. 47. p. 347.
8. 45th Brazilian Congress of Clinical Pathology, Alterations in serum levels of apolipoprotein A1 in HIV-1-infected. Cunha, J. ; Maselli, L. M. F. ; Treitinger, A. ; Spada, C. ; Bydlowski, S. P. Florianópolis. Jornal Brasileiro de Patologia e Medicina Laboratorial, 2011. v. 47. p. 353.
9. 45th Brazilian Congress of Clinical Pathology, Atherogenic risk and antiretroviral therapy in HIV-1 infected. Cunha, J. ; Maselli, L. M. F. ; Treitinger, A. ; Spada, C. ; Bydlowski, S. P. Florianópolis. Jornal Brasileiro de Patologia e Medicina Laboratorial, 2011. v. , . p. 353.
10. 45th Brazilian Congress of Clinical Pathology, Effect of reverse transcriptase inhibitors efavirenz and nevirapine on serum concentrations of HDL-cholesterol in HIV+. Cunha, J. ; Maselli, L. M. F. ; Levy, D. ; Spada, C. ; Bydlowski, S. P. Florianópolis. Jornal Brasileiro de Patologia e Medicina Laboratorial, 2011. v. 47. p. 347.

11. 45th Brazilian Congress of Clinical Pathology, Fibrinogen as auxiliary marker of atherogenic risk in HIV-1-infected. Cunha, J. ; Maselli, L. M. F.; Treitinger, A. ; Spada, C. ; Bydlowski, S. P., 2011, Florianópolis. Jornal Brasileiro de Patologia e Medicina Laboratorial, 2011. v. 47. p. 353.
12. 45th Brazilian Congress of Clinical Pathology. Maselli, L. M. F. ; Cunha, J. ; LEVY, D. ; spada, C. ; Bydlowski, S. P. . Decreased paraoxonase-1 activity is associated with alterations of HDL in HIV-1 infected using HAART. 2011, Florianópolis. 45o Congresso Brasileiro de Patologia Clínica, 2011. v. 47. p. 355.
13. 45th Brazilian Congress of Clinical Pathology. Maselli, L. M. F. ; Cunha, J. ; Levy, D. ; Spada, C. ; Bydlowski, S. P. . Changes in the concentrations of HDL and paraoxonase-1 activity in HAART composed of different protease inhibitors. Florianópolis. Jornal Brasileiro de Patologia e Medicina Laboratorial, 2011. v. 47. p. 356.
14. 55ª Região Brasileira da Sociedade Internacional de Biometria (RBRAS) – Florianopolis, SC. "A (não) escolha profissional pelo magistério: atratividade da carreira docente para a educação básica na visão de ingressantes de cursos superiores" Elisete C. Q. Aubin.
15. 56th Annual Conference on Magnetism & Magnetic Materials, October 30 - November 3, 2011, Scottsdale, Arizona, USA. "Ferromagnetic resonance of ferrolyotropic liquid crystals and ferrofluids", F. R. Arantes, D. R. Cornejo, and C.A.Ramos.
16. 58th World Statistics Congress of the International Statistical Institute, Dublin – Irlanda.2011. "Nonparametric Wavelet Regression with Correlated Errors".Elisete C. Q. Aubin.
17. 5º EniFarmed. Maria A. Santos, Ivair D. Gonçalves, Oseraldo V. Rocha, Claudete J. Valduga. Nanoemulsão lipídica como veículo para um derivado lipofílico de um análogo da curcumina, - São Paulo, SP, 2011.
18. 64th Annual Meeting of the American Physical Society Division of Fluid Dynamics. Miranda, José A. ; Chen, C. -Y. ; Huang, Yu-Sheng . Diffuse interface approach to rotating Hele-Shaw flows. Baltimore. Bulletin of the American Physical Society. New York : The American Physical Society, 2011. v. 56. p. 55-55.
19. 66º Congresso da Sociedade Brasileira de Cardiologia, 2011, Porto Alegre. Arq Bras Cardiol. São Paulo: SBC Núcleo Interno de Publicações, 2011. v. 97. p. 71-71. Biomarcadores associados aos desfechos cardiovasculares de longo prazo em diabéticos tipo 2. Bianco, Henrique T ; Izar, MCO ; Fonseca, HAR ; Helfenstein, Tatiana ; Ihara, S. S. M. ; Ferreira, CE ; Fonseca, Francisco A H .
20. 66º Congresso da Sociedade Brasileira de Cardiologia, 2011, Porto Alegre. Arq Bras Cardiol. São Paulo : SBC Núcleo de Publicações, 2011. v. 97. p. 16-16. .Maior mobilização de células progenitoras endoteliais em corredores de elite. Bittencourt, CR; Franca, C. N.; Izar, MCO ; Fonseca, HAR ; Fonseca, Francisco A H .
21. 66º Congresso da Sociedade Brasileira de Cardiologia. Kasmas, SH ; IZAR, MCO ; Franca, C. N. ; Gonsales, SC ; Moreira, FT ; Helfenstein, Tatiana ; Moreno, Ronilson A ; Borges, Ney C ; Fonseca, Francisco A H . Efeitos de terapias hipolipemiantes muito efetivas na s. 2011, Porto Alegre. Arq Bras Cardiol, 2011. v. 97. p. 91-91.
22. 66º Congresso da Sociedade Brasileira de Cardiologia.Pomaro, Daniel Roberto; Helfenstein, Tatiana; Nader, HB ; Izar, MCO ; Fonseca, Francisco A H ; Ihara, S. S. M. . Ação da inibição da enzima conversora da angiotensina em célula endotelial de aorta de coelho, em condições de hipercolesterolemia e hiperglicemia, em modelo in vivo e in vitro. Porto Alegre. Arq Bras Cardiol. São Paulo : SBC Núcleo de Publicações, 2011. v. 97. p. 38-38.

23. 7th Brazilian German Workshop on Applied Surface Science, Búzios, Rio de Janeiro, 3-8 April 2011. "A simple model to proton transport in PEM fuel cells".:L. P. Figueiredo, M. Santos and W. Figueiredo.
24. 8th Liquid Matter Conference. Ions at Air-Water Interface: Surface Tensions and Surface Potentials of Electrolyte Solutions, Viena, Austria, setembro (2011). Yan Levin.
25. 8th Liquid Matter Conference.Electrical response of an electrolytic cell in the presence of adsorption and recombination of ions. 2011. Luiz Roberto Evangelista.
26. AACR 102nd Annual Meeting 2011, Orlando (FL), Estados Unidos. Maria A. Santos, Ivair D. Gonçalves, Oseraldo V. Rocha, Paulo C. Pardi, Bruno C. Guerrieri, Ana S. Marques, Wendy K. Mendes, José A. Quincoces, Claudete J. Valduga. "In vitro and in vivo antitumor studies of a lipophilic curcumin derivative loaded lipid-based nanoemulsion" -. Proceeding of the American Association for Cancer Research, 2011.
27. APS March Meeting 2011, março 21-25, 2011, Dallas, Texas, USA. "The elastic Maier-Saupe-Zwanzig model and some properties of nematic elastomers", Danilo Liarte, Silvio Salinas e Carlos Yokoi.
28. Barbara Bianca Gerbelli,Rafael Leite Rubim, Emerson Rodrigo Teixeira da Silva, Cristiano Luis Pinto de Oliveira, Elisabeth Andreoli de Oliveira (oral). "Interactions between uncharged lipid bilayers"
29. BIT's 1st Annual Symposium of, Drug Delivery Systems, de 03-05 de novembro em Shenzhen, China. An Oral Lipid-Based Formulation of Miltefosine, an Antileishmanial Drug. Claudete J. Valduga*, José J.G. Bitencourt, Maria A. Santos, Ana C. Medeiros, Márcia R.M. Santos.
30. BP100 Interaction with Membrane Models. Effects of Peptide/Lipid Ratio and Interfacial Charge. Manzini, M.C., Perez, K.R., Riske, K.A., Rodrigues, M.A., Bemquerer, M.P., Cuccovia, I.M.
31. Congresso Brasileiro de Hematologia e Hemoterapia Macedo, C. G. ; Maselli, L. M. F. ; Oliveira, S. C. ; Bydlowski, S. P. . Mutations factor V Leiden and prothrombin G20210A in patients with heparin induced thrombocytopenia. São Paulo. Revista Brasileira de Hematologia e Hemoterapia, 2011. v. 33. p. 129.
32. Congresso Brasileiro de Hematologia e Hemoterapia Medeiros, N. B. ; Maselli, L. M. F. ; Chaves, D.S.C. ; Silva, K.S. ; Bydlowski, S. P. . Frequency of human platelet antigens (HPA) 1 to 13 in a sample of healthy population. São Paulo. Revista Brasileira de Hematologia e Hemoterapia, 2011. v. 33. p. 363.
33. Congresso Brasileiro de Hematologia e Hemoterapia Silva, K.S. ; Maselli, L. M. F. ; Chaves, D.S.C. ; Bydlowski, S. P. . Lack of association of C677T MTHF-R (methylene-tetrahydrofolate reductase) polymorphism in patients with diffuse large B cell lymphoma. São Paulo. Revista Brasileira de Hematologia e Hemoterapia, 2011. v. 33. p. 224.
34. Congresso Brasileiro de Hematologia e Hemoterapia. Macedo, C. G. ; Maselli, L. M. F. ; Gualandro, S. F. M. ; Fonseca, G. H. H. ; Chamone, D. A. F. ; Bydlowski, S. P. . Study of paraoxonase 1 and 2 in patients with sickle cell disease., 2011, São Paulo. Revista Brasileira de Hematologia e Hemoterapia, 2011. v. 33. p. 46.
35. Congresso Brasileiro de Hematologia e Hemoterapia. Maselli, L. M. F. ; Chaves, D.S.C. ; Levy, D. ; gutierrez, E. B. ; bydlowski, S. P. Genetic polymorphisms GSTM1 and GSTT1 in the glutathione S-transferase gene (GST) in HIV positive individuals. São Paulo. Revista Brasileira de Hematologia e Hemoterapia, 2011. v. 33. p. 403.
36. Congresso Brasileiro de Hematologia e Hemoterapia. Maselli, L. M. F. ; chaves, D.S.C. ; oliveira, S. C. ; bydlowski, S. P. . Frequency of human platelet antigens

(HPA) 1 to 13 in patients with diagnostic of heparin induced thrombocytopenia., 2011, São Paulo. Revista Brasileira de Hematologia e Hemoterapia, 2011. v. 33. p. 118.

37. Congresso Brasileiro de Hematologia e Hemoterapia. Maselli, L. M. F. ; Cunha, J. ; Levy, D. ; Treitinger, A. ; Spada, C. ; Bydlowski, S. P. . Increased hemoglobin levels are correlated with the increase of CD4+ lymphocytes in subjects seropositive for HIV-1. São Paulo. Revista Brasileira de Hematologia e Hemoterapia, 2011. v. 33. p. 196.
38. Congresso Brasileiro de Hematologia e Hemoterapia. The increase in the number of CD4+ lymphocytes allows the recovery of serum iron in HIV-1-infected, independently of the type of antiretroviral therapy. Cunha, J. ; Maselli, L. M. F. ; Maranhao, R. C. ; Treitinger, A. ; Spada, C. ; Bydlowski, S. P., 2011, São Paulo. Revista Brasileira de Hematologia e Hemoterapia, 2011. v. 33. p. 196.
39. Congresso Internacional de Farmácia de Ribeirão Preto. Preza, S. L. ; Prates, E. ; Olivier, D. S. ; Ito, A. S. . Parametrization And Molecular Dynamics of the Fluorescent Probe Ahba in Water and Popc Membranes. Ribeirão Preto. Resumos CIFARP, 2011.
40. Damasceno, N. R. T.; Sanibal, CA ; Machado, T. S. . Relation of Paraoxonase (PON-1) Activity and Leptin Levels in Obese Adolescents. 2011. (Apresentação de Trabalho/Congresso).
41. Encontro de Física 2011, M.Berardi ; ITO, A. S. . Interaction of the fluorescent analogue of the antileishmanial drug miltefosine MT-BODIPY with model membranes. In: 2011, Foz do Iguaçu. Livro de Resumos Encontro de Física 2011. São Paulo : SBF, 2011.
42. Encontro de Física 2011, L.C. Alves; A. Alonso ; Ito, A ; Marquezin, C. . Study of interactions between molecules of biological interest and models of natural membranes by fluorescence spectroscopy. 2011, Foz do Iguaçu. Livro de Resumos Encontro de Física 2011. São Paulo: SBF, 2011.
43. Encontro de Física 2011. Comunicação em congresso: E. arashiro e F. A. Severino dos Santos "Scaling exponents of rough surfaces generated by Baxter-Wu model, Junho de 2011, Foz do Iguaçu.
44. Encontro de Física 2011. Comunicação em congresso: E. Arashiro, S. P. Ribeiro, A. C. A. Carneiro e M. R. F. Luzia, "Population dynamics of alternating dominance among ant genera via cellular automata", Junho de 2011, Foz do Iguaçu.
45. Encontro de Física 2011. E.S.SOUZA,; Alberto Katagiri ; ITO, A. S. . FRET studies of conformational changes in heparin-binding peptides. Foz do Iguaçú. Livro de Resumos Encontro de Física 2011. São Paulo: SBF, 2011.
46. Encontro de Física 2011. Organização do simpósio "Mecânica Estatística de Não-equilíbrio", Tânia Tomé, Junho de 2011, Foz do Iguaçu.
47. Encontro de Física 2011. Pazin, W.M. ; Ito, A . Fluorescent studies of structural and dynamic properties of phospholipid vesicles. Foz do Iguaçú. Livro de Resumos Encontro de Física 2011. São Paulo: SBF, 2011.
48. Encontro de Física 2011. Petrucci, T.; da Silva, KA; Mukai, Hatsumi ; Fernandes, Paulo R G . Electrical Impedance of MBBA liquid crystal associate to electrical circuits. Foz do Iguaçu., 2011.
49. Encontro de Física 2011. Seminário: "Epidemic spreading processes described by stochstic lattice models", Tânia Tomé, Junho de 2011, Foz do Iguaçu.
50. Encontro de Física, 2011. Tufaile, A. P. B.; Tufaile, A.; Liger-Belair G. "Hyperbolic Prism, Kaleidoscope and Foams in Hele-Shaw Cells". Foz do Iguaçu. Resumos. São Paulo: Sociedade Brasileira de Física, 2011.
51. Encontro de Física, 2011. Tufaile, A.; Tufaile, A. P. B. "Magnetovertebrates based on ferrofluids". Foz do Iguaçu. Resumos. São Paulo: Sociedade Brasileira de Física, 2011.

52. Encontro de Física. L.P. de Figueiredo, W. Figueiredo e M. Santos, “Um modelo simples para o transporte de prótons em células a combustíveis poliméricas”. Foz do Iguaçu, Paraná, 5 a 10 de junho de 2011.
53. Encontro de Física. M. F. Andrade e W. Figueiredo, “Dependence of the critical exponents on the initial state in a nonequilibrium reactive system”, Foz do Iguaçu, Paraná, 5 a 10 de junho de 2011.
54. Eraldo de Sales, Alexandre Alarcon do Passo Suaide, Cristiano Luis Pinto de Oliveira.
55. Expression and Purification of a Chimerical Protein containing PON1 and a Carbohydrate Binding Domains. Gonçalves, L.M., Chaimovich, H., Cuccovia, I. M., Marana, S.R.
56. Gordon Research Conference on Liquid Crystals.Non-Markovian diffusion and the adsorption-desorption process of suspended particles in liquid crystals. 2011. Luiz Roberto Evangelista.
57. I Encontro de Cristalografia Estrutural - SC-XRD – Bruker
58. II Simpósio brasileiro de planejamento e desenvolvimento de fármacos para doenças negligenciadas, José J. G. Bitencourt, Ana C. Medeiros, Ellen da Silva, Carolline P. Pinto, Oseraldo V. Rocha, Márcia R. M. Santos, Claudete J. Valduga. In vitro studies of a Lipid-Based Formulation of Miltefosine., São Paulo, SP, 2011.
59. III Simpósio Internacional de Imunodeficiências Primárias. Sini, B. C. ; Maselli, L. M. F. ; Levy, D. ; Bydlowski, S. P. ; Cohon, A. ; C.M.Kokron, ; Barros, M. T. . Study of the polymorphisms of paraoxonase gene family in patients with common variable immunodeficiency. São Paulo. Anais, 2011.
60. Immunohistochemistry of bone metabolism in rats with estrogen deficiency. Jardini, M. A. N. ; Tera, T.M. ; Nascimento, R.D. ; Prado, R. F. ; Meyer, A.C.A. 2011. (Apresentação de Trabalho/Congresso).
61. International Association for dental research. JARDINI, M. A. N. ; TERA, T.M. ; MEYER, A.C.A. ; NASCIMENTO, R.D. ; PRADO, R. F. . Immunohistochemistry of bone metabolism in rats with estrogen deficiency. 2011, San Diego. 89th general session&exhbition of the IADR, 2011.
62. Ion Binding to Zwitterionic Micelles. Effect of the Head Group Size. Schveitzer, B., Chaimovich, H., Cuccovia, I.M.
63. Ion Sepecific Effects at Interfaces,apresentado no American Chemical Society, MarchMeeting,. Yan Levin
64. Jens Dobrindt, Cassio Alves, Emerson Rodrigo Teixeira da Silva, Cristiano L. P. Oliveira, Frederic Nallet, Laurence Navailles, Elisabeth Andreoli de Oliveira (oral). “Anisotropic Diffusion of Dna Fragments”
65. MELLO, APQ ; ROS, E. ; DAMASCENO, N. R. T. . PREDIMED diets change electronegative low density lipoprotein of subjects with high cardiovascular risk. 2011. (Apresentação de Trabalho/Congresso).
66. Mello, APQ; ROS, E.; Damasceno, N. R. T. Influence of obesity on adipokinesand electronegative low density lipoprotein levels in adolescents. 2011. (Apresentação de Trabalho/Congresso).
67. Meyer, A.C.A. ; Tera, T.M. ; Nascimento, R.D. ; Prado, R. F. ; Jardini, M. A. N. . A Influência da deficiência estrogênica na formação óssea: estudo imunoistoquímico. 2011. (Apresentação de Trabalho/Congresso).
68. Moscow International Symposium on Magnetism. 21-25 August 2011, Moscow."Nonlinear Absorption of Surfacted Ferrofluid Investigated with Z-Scan Technique".Espinosa D., Soga D., Alves S., Figueiredo Neto A.M.
69. Mukai, H.; Fernandes, Paulo Ricardo Garcia; R R Guimarães; Mendes, Renio dos Santos . Defect and antidefect analysis in liquid crystalline systems by Digal's Statistic. 2011. (Apresentação de Trabalho/Congresso).

70. Noveno Congreso Latinoamericano de Sociedades de estadística, Viña Del Mar, Chile.“Cardiovascular Disease Parameters in Periodontitis”Elisete C.Q.Aubin
71. Olivier, D. S. ; Preza, S. L. ; Galenbeck, S. ; Ito, A. S. . Electronic Transitions In Ortho-Aminobenzoic Acid: Computer Simulation and Spectroscopic Studies. In: Congresso Internacional de Farmácia de Ribeirão Preto, 2011, Ribeirão Preto. Resumos CIFARP, 2011.
72. Palestra oral: “Hight quality SAXS data obtained on Bruker-Nanostar instrument”. 19/06/2011-20/06/2011.
73. Pedro Leonidas Oseliero Filho, Barbara Bianca Gerbelli, Alexander Hideki Oniwa Wada, Elisabeth Andreoli de Oliveira, Cristiano Luis Pinto de Oliveira. “Simulation of Neutral Lipids Using Finite Element Method: Focus on Containment of Biomolecule DNA”
74. Poster: Effects caused by Triton X-100 on lipid bilayers of different composition. França, A.D.C., T. P. Sudbrack, N. L. Archilha, R. Itri, K. A. Riske. Biophys. J. 102 (2012) 290a.
75. Renata Naporano Bicev, Hélio Brandão, Luis Eduardo Coelho Andrade, Elisabeth Andreoli de Oliveira, Cristiano Luis Pinto de Oliveira. “Scattering Studies on cryoglobulins statiliby and aggregation properties”
76. Roberto Morato Fernandez, Marcos Roberto de Mattos Fontes, Ângelo José Magro, Carlos Alexandre Henrique Fernandes, Guilherme Henrique Marchi Salvador, Cristiano Luis Pinto Oliveira, Daniela Priscila Marchi-Salvador (oral). “Study of Myotoxic phospolipases Bothrops moojeni by SAXS”
77. Seminário: “Nonequilibrium lattice models with Boltzmann-Gibbs probability distribution”, Mário José de Oliveira, Julho de 2011, Nancy, França.
78. Soft Matter. Physics Approaches to Biology. Ions at Interfaces: Surface Tensions, Surface Potentials and Critical Coagualation Concentrations of Electrolyte Solutions and Colloidal Suspensions, Santa Barbara, USA, maio (2011). Yan Levin.
79. Study of H^+ concentration in the surface of SDS micelles. M. F. C. Andrade, I. M. Cuccovia, H. Chaimovich.
80. VI Brazilian Meeting on Simulational Physics, Cuiabá, Mato Grosso, 2-6 August 2011:A. Weizenmann and W. Figueiredo, “Magnetic properties of nanoparticles due to long range dipolar interactions”.
81. VII CONFIAM - Congresso de Física Aplicada à Medicina. Minicurso de 2h sobre o tema: “SAXS”. 28/9/2011 a 01/10/2011.
82. VIII Escola Brasileira de Magnetismo, Ouro Preto, Minas Gerais, 16-21 outubro 2011:M. J. Correia e W. Figueiredo, “Arrano estrutural e propriedades magnéticas de nanopartículas magnéticas”.
83. XII Escola de Modelos de regressão – Fortaleza, CE "Modelos mistos para marcadores cardiovasculares em pacientes com periodontite". Elisete Conceiçaõ Q. Aubin.
84. XXXIV Encontro Nacional de Física da Matéria Condensada. Foz do Iguaçu. "Optical properties of tetrasulphonated phtalocyanines, free base and Nickel, in solutions at different pHs". L. P. da Silva Neto, A. A. Hidalgo, F. Eroni P Santos, H. N. da Cunha, M. L. Vega, Diogo Soga, Sarah Alves.
85. XXXIV Encontro Nacional de Física da Matéria Condensada. Foz do Iguaçu. "Study of the nonlinear optical response of LDL in periodontal treatment". Andréa M. Monteiro, Eduardo Ramos Sanchez, Maria A. N. Jardini, Sarah Alves, Luiz Henrique Silva, Antonio M. Figueiredo Neto, Magnus Gidlund
86. XXXIV Encontro Nacional de Física da Matéria Condensada. Foz do Iguaç"Cu and Fe metallic ions-mediated oxidation of lyotropic-like low-density lipoproteins studied by NMR, TEM and Z-scan Technique". A.M. Monteiro, S.R.

Rabbani, A.C. Bloise, M. Gidlund, D.S.P. Abdalla, A.M. Figueiredo Neto, S.L. Gómez, S.M. Carneiro, S. Alves. u.

87. XXXIV Encontro Nacional de Física da Matéria Condensada. Foz do Iguaçu. "Z-scan Technique For Diagnosis Of Prostate Cancer In Blood". Lilia C. Courrol, Sarah Alves, Antonio Martins F. Neto, Camila T. Nabeshima, Flávia R. O. Silva , Ricardo Elgul Samad.

Training of personnel (work already completed)

Post-doctors

1. Leandro Gustavo de Oliveira. 2011. Universidade Federal de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Supervisor: Niels Olsen Saraiva Câmara.
2. Paulo Guilherme Renesto. 2011. Universidade de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Supervisor: Niels Olsen Saraiva Câmara.

Doctors

1. Luiz Fernando Muniz Pinheiro. Tesis presented at Universidade Federal de SãoPaulo – Escola Paulista de Medicina for otaining the degree of Doctor of sciences. 2011. Advisor: Francisco A H Fonseca, Co-advisor: Maria Cristina Izar.
2. Maria Socorro Seixas Pereira. 07/12/2011. Advisor: Marcelo Leite Lyra.
3. Ana Paula Fernandes Bertocchi. Thesis (Doctor Degree in Medicine, Neprology) - Universidade Federal de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. 2011. Orientador: Niels Olsen Saraiva Câmara.
4. Carolina Nunes França. Thesis presented to Universidade Federal de São Paulo – Escola Paulista de Medicina for obtaining a Doctor degree in Sciences. 2011 Advisor: Francisco A H Fonseca – Co-adivisor: Maria Cristina Izar.
5. Claudine Maria Alves Feio. Thesis presented to Universidade Federal de São Paulo – Escola Paulista de Medicina for obtaining a Doctor degree in Sciences. 2011. Advisor: Francisco A. H. Fonseca, Co-advisor: Maria Cristina Izar.
6. Cleidilane de Oliveira Sena. Magneto-optical, mechanical, and nonlinear properties of elastomers. Doctoral Thesis. 2011. Instituto de Física da USP. Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Antônio Martins Figueiredo Neto.
7. Davi Antunes de Oliveira. Optical microscopy and order parameter of nematic phases. 2011. Doctoral Thesis in Physics. Universidade Estadual de Maringá, Advisor: Antonio José Palangana.
8. Eduardo do Carmo, IFUSP, 2011, fellowship from Fapesp. Advisor: Silvio Salinas.
9. Emerson Rodrigo da Silva. Universidade de São Paulo. Advisor: Elisabeth de Oliveira Andreoli.
10. Flávia Rodrigues de Oliveira Silva. 2011. Thesis in Medicine (Nephrology) - Universidade Federal de São Paulo. Advsior: Lilia Courrol.
11. Jonathas Nunes da Silva. 2011. Universidade Federal do Rio Grande do Sul, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Márcia Cristina Bernardes Barbosa.
12. José Ricardo Rodrigues Duarte. 25/03/2011. Advisor: Marcelo Leite Lyra
13. Larissa Martins Gonçalves (December 2011) - IQUSP. Advisor: Iolanda Cuccovia.

14. Mariane Tami Amano. Doctoral Thesis in Immunology - Universidade de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. 2011. Advisor: Niels Olsen Saraiva Câmara.
15. Ney Marçal Barraz Junior. 2011. Universidade Federal do Rio Grande do Sul, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Márcia Cristina Bernardes Barbosa.
16. Pedro Manoel Mendes de Moraes Vieira. Doctoral Thesis in Immunology - Universidade de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. 2011. Advisor: Niels Olsen Saraiva Câmara.
17. Rodolfo Teixeira de Souza. 2012. Doctoral Thesis in Physics - Universidade Estadual de Maringá, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Luiz Roberto Evangelista.

Masters

1. Ana Paula Perdigão Praxedes. 2011. Universidade Federal de Alagoas, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Ítalo Marcos Nunes de Oliveira.
2. Ângela Castoldi. 2011. Universidade Federal de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Niels Olsen Saraiva Câmara.
3. Átila Pereira Ribeiro. 08/08/2011. Advisor: Marcelo Leite Lyra
4. Carlos Eduardo Bistafa da Silva. 2011. Universidade de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Sylvio Roberto Accioly Canuto.
5. Felipe França. 27/07/2011. Advisor: Marcelo Leite Lyra
6. Fernando da Silva. 2011. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Sylvio Roberto Accioly Canuto.
7. Filipe Ferreira Santos Leão. 26/02/2011. Advisor: Marcelo Leite Lyra
8. Flavia D Angelo Maculan. Universidade Federal de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Niels Olsen Saraiva Câmara.
9. Frederick Wasinski. 2011. Universidade Federal de São Paulo, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Niels Olsen Saraiva Câmara.
10. Ítalo Adelk Silva Souza. 2011. Universidade Bandeirante de São Paulo. Advisor: Claudete Valduga.
11. Jamile Lorena de Paula. 2012. Universidade Estadual de Maringá, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Luiz Roberto Evangelista.
12. José Higino Damasceno Júnior; IFUSP, 2011. Advisor: Tânia Tomé
13. José Jardes da Gama Bitencourt. 2011. Universidade Bandeirante de São Paulo. Advisor: Claudete Valduga.
14. José Victor Bartol Rodriguez. 2011. Instituto de Matemática e Estatística-USP, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Viviana Giampaoli.
15. Keyde Cristina Martins de Melo – Programa de Pós-Graduação Interunidades em Biotecnologia (USP, IBu, IPT). Advisor: Rita de Cássia Ruiz
16. Layla Galindo. 2011. Dissertation (Mestrado em Ciências Biológicas (Biologia Molecular)) - Universidade Federal de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Co-advisor: Niels Olsen Saraiva Câmara.

17. Leandro Batirolla Krott. Programa de Pós-Graduação em Física, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Márcia Cristina Bernardes Barbosa.
18. Mariana Canalle Manzine. IQUSP. Advisor: Iolanda Cuccovia.
19. Roberta Rarumy Ribeiro de Almeida. 2012. Universidade Estadual de Maringá, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Luiz Roberto Evangelista.
20. Soraia Hani Kasmas. Universidade Federal de São Paulo – Escola Paulista de Medicina. Advisor: Francisco A. H. Fonseca, Co-advisor: Maria Cristina Izar.
21. Ticiana Machado Sampaio. Faculdade de Saúde Pública - Universidade de São Paulo. Advisor: Nágila Raquel Teixeira Damasceno.

Undergraduate research

1. Camila Galvão Cardoso. 2011. Faculdade de Odontologia do Campus de São José dos Campos – UNESP. Advisor: Daniel Cornejo.
2. Camila Galvão Cardoso. 2011. Faculdade de Odontologia do Campus de São José dos Campos - UNESP, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Maria Aparecida Neves Jardini.
3. Carolline de Paula Pinto – Undergraduate fellowship from UNIBAN. Advisor: Claudete Valduga.
4. Ellen da Silva. Study of the stability of formulations with miltefosine. Advisor: Claudete Valduga.
5. Felipe Grabarz. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Niels Olsen Saraiva Câmara.
6. Luciano Hellmeister Mendes. 2011. IME-USP. Undergraduate fellowship from the program "Teaching with Research". Advisor: Viviana Giampaoli.
7. Renato Ribeiro Guimarães. 2011. Universidade Estadual de Maringá. Advisor: Hatsumi Mukai.

Training of personnel (work in progress)

Post-doctors

1. André César da Silva. Started in 2009. Instituto Israelita de Ensino e Pesquisa Albert Einstein. Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Supervisor: Lionel Fernel Gamarra Contreras.
2. Erol Akpinar. Started in 2011. The Scientific and Technological Research Council of Turkey. Supervisor: Antônio Martins Figueiredo Neto.
3. Evandro Freire Silva (FAPESP). IFUSP. Supervisor: Mário J. de Oliveira
4. Javier Bustamante Mamani. Started in 2009. Instituto Israelita de Ensino e Pesquisa Albert Einstein. Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Supervisor: Lionel Fernel Gamarra Contreras.
5. Jorge Alexandre Nogueira Santos. FAPESP. Studies of specificity and inhibition of hKLK 1, hKLK 5, hKLK 6 and hKLK 7. Supervisor: Maria Juliano.
6. José Ricardo G. Mendonça (CNPq). IFUSP. Supervisor: Mário J. de Oliveira
7. Lorena F. Pavon. Instituto Israelita de Ensino e Pesquisa Albert Einstein. Supervisor: Lionel Fernel Gamarra Contreras.
8. Rafael Costa Santos Rocha. Supervisor: Maria Juliano.
9. Tatiana Taís Sibov. Started in 2009. Instituto Israelita de Ensino e Pesquisa Albert Einstein. Supervisor: Lionel Fernel Gamarra Contreras.

Doctor students

1. Alejandra Andrea Tapia Silva. Started in 2011. Instituto de Matemática e Estatística-USP, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Viviana Giampaoli.
2. Alexandre Pereira dos Santos. 2009. Universidade Federal do Rio Grande do Sul, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Yan Levin.
3. Alexsander Ramos Duarte. Investigation of ionic adsoption and ohmic conductivity phenomena in electrolytes and complex fluids by he technique of impedance spectroscopy in the frequency interval between 100Hz and 30MHz. Started in 2010. Instituto de Física da USP, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Antônio Martins Figueiredo Neto.
4. Ana Carolina Stern. Efficinecy of LDE in vivo and in vitro as a vector of RNA for antitumor therapy. Advisor: Sérgio Bydlowski
5. Ana Paula de Queiroz Mello. Started in 2007. Faculdade de Saúde Pública, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Nágila Raquel Teixeira Damasceno.
6. Ana Paula Perdigão Praxedes. Started in 2011. Universidade Federal de Alagoas, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Ítalo Nunes de Oliveira.
7. Antonio Rodrigues da Cunha. Started in 2009. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Kaline Rabelo Coutinho.
8. Áttila L. Rodrigues (desde 2009, Capes). IFUSP. Advisor: Tânia Tomé
9. Cassio Alves. Started in 2011. Universidade de São Paulo, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Cristiano Luis Pinto de Oliveira.
10. Celma Muniz Martins. Advisor: Maria Cristina Izar, Co-Advisor: Francisco A. H. Fonseca.
11. Celso Luiz Sigoli Risi. Started in 2010. Thesis at the Instituto de Física da USP. Advisor: Antônio Martins Figueiredo Neto.
12. Clarice Silvia Taemi Origassa. Started in 2010. Thesis at the Universidade Federal de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Niels Olsen Saraiva Câmara.
13. Daniel Inoue Koga. Started in 2011. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Co-Advisor: Kaline Rabelo Coutinho.
14. Danilo Candido de Almeida. Started in 2010. Universidade Federal de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Niels Olsen Saraiva Câmara.
15. David R. de Souza (since 2009, CNPq). IFUSP. Advisor: Tânia Tomé
16. Diego Magno Assis. Synthesis and characterization of inhibitors of kallikrein tissues. Advisor: Maria Juliano
17. Douglas de Andrade. CNPq. Study of the specificity of human kallikrein. Advisor: Maria Juliano.
18. Eduardo Olímpio de Ribeiro Dias. Started in 2010. Universidade Federal de Pernambuco, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: José Américo de Miranda Neto.
19. Elísio Joji Sekiya. Evaluation of cell products for treating implantable spinal cord injuroes in Wistar rats. Advisor: Sérgio Bydlowski.

20. Evanildo Gomes Lacerda Júnior. Started in 2009. Universidade de São Paulo, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Kaline Rabelo Coutinho.
21. Freddy Hernandez Barajas. Started in 2010. Instituto de Matemática e Estatística-USP, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Viviana Giampaoli.
22. Germano Heinzelmann. Started in 2009. Universidade Federal de Santa Catarina, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Co-Advisor: Wagner Figueiredo.
23. Henrique Andrade Rodrigues da Fonseca – Role of anti-oxidized LDL and proinflammatory cytokines antibodies in cardiovascular diseases. Advisor: Maria Cristina Izar , Co-Advisor Francisco A H Fonseca.
24. Isis Tande da Silva. Started in 2007. Faculdade de Saúde Pública, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Nágila Raquel Teixeira Damasceno.
25. Juliana Rodrigues de Oliveira. CNPq. Study of the specificity of tissue kallikrein. Advisor: Maria Juliano
26. Karin Ayumi Tamura. 2008. Instituto de Matemática e Estatística-USP. Advisor: Viviana Giampaoli.
27. Keyde Cristina Martins de Melo (fellowship CAPES-CNPq). Advisor: Rita de Cássia Ruiz.
28. Leandro Bartirolla Krott. Started in 2012. Programa de Pós-Graduação em Física, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Márcia C. Barbosa.
29. Lidiane Maria Omena da Silva. Started in 2009. Universidade Federal de Alagoas, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Ítalo Nunes de Oliveira.
30. Lívia Rosa Fernandes. Characterization of the cytotoxic potential of oxisterols as a therapeutic strategy. Advisor: Sérgio Bydlowski.
31. Marcelo Hidalgo Cardenuto. Started in 2009. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Sylvio Roberto Accioly Canuto.
32. Marcos Joao Correia. Started in 2011. Universidade Federal de Santa Catarina, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Wagner Figueiredo.
33. Marcus Vinicius Araujo Damasceno. Started in 2010. Universidade de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Kaline Rabelo Coutinho.
34. Matheus Correa Costa. Started in 2010. Universidade de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Niels Olsen Saraiva Câmara.
35. Natalia Mastantuono Nascimento. Characterization of multimeters of von Willebrand factor and the activity of ADAMTS-13 in patients with the primary antiphospholipid syndrome. Advisor: Sérgio Bydlowski.
36. Olga Usuga Manco. Started in 2010. Instituto de Matemática e Estatística-USP, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Viviana Giampaoli.
37. Paula Fernanda Bienzobaz. Started in 2007. Universidade de São Paulo, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Silvio Roberto de Azevedo Salinas.
38. Perseu Angelo Santoro. Started in 2010. Universidade Estadual de Maringá. Advisor: Luiz Roberto Evangelista.

39. Priscila Ribeiro dos Santos. Started in 2009. Instituto de Física da USP, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Antônio Martins Figueiredo Neto.
40. Rafael de Carvalho Barbosa. Started in 2011. Instituto de Física da Universidade Federal do Rio Grande do Sul, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Márcia C. Barbosa.
41. Rafael Rocha da Silva. Started in 2010. Universidade Federal de Alagoas, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Ítalo Nunes de Oliveira.
42. Roberta Viana Ferreira. Started in 2009. Universidade Federal de Minas Gerais, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Co-Advisor: Lionel Fernel Gamarra Contreras.
43. Rodolfo Teixeira de Souza. Started in 2009. Universidade Estadual de Maringá, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Luiz Roberto Evangelista.
44. Rodrigo do Monte Gester. Started in 2007. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Sylvio Roberto Accioly Canuto.
45. Sara Maria Moreira Lima Verde. Started in 2010. Faculdade de Saúde Pública. Advisor: Nágila Raquel Teixeira Damasceno.
46. Sérgio Henrique Albuquerque Lira. Started in 2010. Universidade Federal de Pernambuco, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: José Américo de Miranda Neto.
47. Sérgio Leandro Preza, defesa prevista para início de 2013. Advisor: Amando Ito.
48. Tábata de Mello Tera. Started in 2010. Faculdade de Odontologia do Campus de São José dos Campos - UNESP. Advisor: Maria Aparecida Jardini.
49. Tarcísio Nunes Teles. Started in 2008. Universidade Federal do Rio Grande do Sul, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Yan Levin.
50. Tatiana Moreira Domingues. Started in 2010. Universidade Federal de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Co-Advisor: Karin do Amaral Riske.
51. Thais Azevedo Enoki. Started in 2011. Universidade de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Co-Advisor: Karin do Amaral Riske.
52. Thiago Escobar Colla. Started in 2008. Universidade Federal do Rio Grande do Sul. Advisor: Yan Levin.
53. Valéria Arruda Machado. Advisor: Maria Cristina Izar, Co-Advisor Francisco A H Fonseca.
54. Vinicius de Andrade Oliveira. Started in 2010. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Niels Olsen Saraiva Câmara.
55. Vinicius Mariani Lenart. Started in 2010. Universidade Estadual de Ponta Grossa. Advisor: Ségio Leonardo Gomez.
56. Yoelvis Orozco Gonzáles. Started in 2008. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Sylvio Roberto Accioly Canuto.

Master of Science students

1. Adriane Marangoni. Started in 2011. Universidade de São Paulo. Advisor: Nágila Raquel Teixeira Damasceno.
2. Alessandra Cappelaro – Formulation of combining oral fluconazole and miltefosine. Advisor: Claudete Valduga. Started in 2011. Universidade Estadual de Maringá, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Luiz Roberto Evangelista.
3. Alessandra Fagiolli. Advisor: Claudete Valduga.
4. Alexandre Penteado Furlan. Started in 2011. Universidade Federal do Rio Grande do Sul, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Márcia C. Barbosa.
5. Aline Jordan Todorovic. Escola de Artes, Ciências e Humanidades - USP. Advisor: Alberto Tufaile.
6. Alyne Marem Silva Barbosa. CNPq. Advisor: Maria Juliano.
7. Ana David Cruz de França. Started in 2010. Universidade Federal de São Paulo, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Karin do Amaral Riske.
8. Andresa Forte. Advisor: Sérgio Bydlowski
9. Augusto Cesar de Andrade Meyer. Started in 2010. Faculdade de Odontologia do Campus de São José dos Campos - UNESP. Advisor: Maria Aparecida Jardini.
10. Bárbara Bianca Gerbelli. Started in 2010. Universidade de São Paulo, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Elisabeth de Oliveira Andreoli.
11. Bruno Mattei. Started in 2010. Universidade Federal de São Paulo, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: karin do Amaral Riske.
12. Carolina Martinez Romão. Advisor: Sérgio Bydlowski
13. Cassiano Donizetti De Oliveira. Started in 2010. Universidade Federal de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Niels Câmara.
14. Claudia Assef Sanibal. Started in 2010. Faculdade de Ciências Farmacêuticas, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Nágila Raquel Teixeira Damasceno.
15. Cristina Gavazzoni. Started in 2011. Instituto de Física da Universidade Federal do Rio Grande do Sul, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Márcia C. Barbosa.
16. Fabíola Keesen Ferreira. 2011. Universidade Federal de Ouro Preto; Advisor: Everaldo Arashiro.
17. Franco Valduga de Almeida Camargo. Dynamics of ions in channels and nanopores. Started in 2007. Universidade Federal do Rio Grande do Sul, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Yan Levin.
18. Igor André Milhorança. Advisor: Elisete Conceição Quintaneiro Aubin.
19. Jamile Lorena de Paula. Started in 2011. Universidade Estadual de Maringá, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Luiz Roberto Evangelista.
20. João Vitor Nogueira Fontana. Started in 2012. Universidade Federal de Pernambuco, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: José Américo de Miranda Neto.
21. Karolline Santana da Silva. Advisor: Sérgio Bydlowski
22. Letícia Bonfante Sicchieri. 2010. Instituto de Pesquisas Energéticas e Nucleares. Advisor: Lilia Courrol.
23. Maria Aparecida dos Santos. Pharmacokinetics and biodistribution of a curcumin analog incorporated into the emulsion in mice. Advisor: Claudete Valduga.

24. Marlene Audin Nuñez. Started in 2011. Universidade de São Paulo. Advisor: Nágila Raquel Teixeira Damasceno.
25. Moniellen Pires Monteiro. Started in 2010. Universidade Federal de Alagoas, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Ítalo Nunes de Oliveira.
26. Oscar Alberto Barbosa Bohorquez (Capes). IFUSP. 2010. Advisor: Tânia Tomé
27. Oseraldo Vieira Rocha. Development of the formulation of a product from curcumin for oral use. Advisor: Claudete Valduga.
28. Pedro Juvencio de Souza Júnior. Started in 2011. Universidade Federal de Alagoas, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Ítalo Nunes de Oliveira.
29. Pedro Leonidas Oseliero Filho. Started in 2011. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Cristiano Luis Pinto de Oliveira.
30. Rafael Dias Silva. Advisor: Adriana Pedrosa Biscaia Tufaile.
31. Rafaela Quintanilha Abrahão. CNPq. Advisor: Maria Juliano
32. Renata Naporano Bicev. Started in 2011. Universidade de São Paulo, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Cristiano Luis Pinto de Oliveira.
33. Rodrigo Garcia. IFUSP. 2010. Advisor: Mário J. de Oliveira
34. Rodrigo Maia Cardozo. Universidade Federal de Santa Catarina, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Wagner Figueiredo
35. Thiago Bento dos Santos. Started in 2010. Universidade Federal de Alagoas, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Advisor: Ítalo Nunes de Oliveira.
36. Thiago Bertiline. Master student (CNPq). Biochemical study of tissue kalekrein. Advisor: Maria Juliano.
37. Tiago Boff Pedro. Universidade Federal de Santa Catarina, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Wagner Figueiredo
38. Vinicius Otavio da Silva. CNPq. Advisor: Maria Juliano
39. Viviane Dias Faustino. Advisor: Sérgio Bydlowski.

Undergraduate research students

1. André da Silva Saijo (FMUSP). Use of mesenchymal stem cells derived from amniotic fluid in chronic kidney disease. Advisor: Sérgio Bydlowski
2. Bergerson van Hallen Vieira da Silva. Started in 2011. Universidade Estadual de Maringá, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Luiz Roberto Evangelista.
3. Caroline de Oliveira Gallo. Started in 2011. Faculdade de Saúde Pública. Advisor: Nágila Raquel Teixeira Damasceno.
4. Denis Goncalves Silva. Started in 2011. Universidade de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo. Advisor: Niels Olsen Saraiva Câmara.
5. Eduardo Ferracioli Oda (FMUSP). Advisor: Sérgio Bydlowski
6. Eduardo Maki Sato (FMUSP). Influence of survini in the transport of RNAi by lipid nanoemulsion. Advisor: Sérgio Bydlowski
7. Eduardo Osório Rizzatti. Started in 2011. Instituto de Fisica da Universidade Federal do Rio Grande do Sul, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Márcia C. Barbosa.

8. Eduardo Sell Gonçalves. Started in 2011. Instituto de Física da USP, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Antônio Martins Figueiredo Neto.
9. Elisa Yumi Royama da Silva. Started in 2011. Faculdade de Saúde Pública. Advisor: Nágila Raquel Teixeira Damasceno.
10. Ellen da Silva – Stability studies of the formulations containing miltefosine. Advisor: Karin do Amaral Riske.
11. Ellen da Silva - Estudos de estabilidade de formulações contendo miltefosine. Claudete Valduga.
12. Eraldo de Sales. Stranded gas detectors fo X-ray: Characterization and development. Started in 2011 - Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. (Advisor: Cristiano Luis Pinto de Oliveira.
13. Fabiana Rossan. Advisor: Lionel Fernel Gamarra Contreras.
14. Felipe Aguiar Severino dos Santos. Ago/2010. CNPq.Advisor: Everaldo Arashiro.
15. Flávia Y. R. Hirata (CNPq). Ago/2011. Advisora: Tânia Tomé
16. Haline Luiz Gonçalves (Bolsa PIBIC-CNPq). Advisor: Rita de Cássia Ruiz.
17. Laura Bottin Piovesan. Instituto de Fisica da Universidade Federal do Rio Grande do Sul, Pró-Reitoria de Pesquisa da UFRGS. Advisor: Márcia C. Barbosa.
18. Luiz Felipe Pereira. Started in 2011. Instituto de Fisica da Universidade Federal do Rio Grande do Sul, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Márcia C. Barbosa.
19. Marcia Regina Figueiredo Luzia (Fapemig). Started in February 2011. Advisor: Everaldo Arashiro
20. Maria Camila Prupper de Freitas. Started in 2011. Faculdade de Saúde Pública. Advisor: Nágila Raquel Teixeira Damasceno.
21. Maria das Graças Lourenço. Started in 2011. Faculdade de Saúde Pública. Advisor: Nágila Raquel Teixeira Damasceno.
22. Mariana Miyagi. Started in 2011. Universidade de São Paulo, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Advisor: Niels Olsen Saraiva Câmara.
23. Renata Oliveira. Started in 2011. Faculdade de Saúde Pública. Advisor: Nágila Raquel Teixeira Damasceno.

Chapters of books published or in press:

1. Barbosa, M. C.; Cristina Gavazzoni; de Oliveira, A. B.; Guilherme K. Gonzatti ;Netz, P. A.; Juliana Z. Paukowski . Phase Diagram and Waterlike Anomalies in Core-Softened Shoulder-Dumbbell Complex Fluids. In: Juan Carlos Moreno-Piraja (Org.). Phase Diagram and Waterlike Anomalies in Core-Softened Shoulder-Dumbbell Complex Fluids. New York: InTech, 2011, v. , p. 291-406.
2. Bydlowski SP; Janz FL. Hematopoietic Stem Cell in Acute Myeloid Leukemia Development. In: Rosana Pelayo (Ed.): Advances in Hematopoietic Stem Cell Research, INTECH , in press.
3. Coronato Courrol, Lilia; Silva, Flávia Rodrigues de Oliveira; Bellini, Maria Helena. Use of the porphyrin autofluorescence for cancer diagnosis In: Porphyrins: Chemistry, Properties and Applications ed. New York: Nova Science Publisher, 2012.
4. Cristiano Luis Pinto Oliveira (2011). Investigating Macromolecular Complexes in Solution by Small Angle X-Ray Scattering, Current Trends in X-Ray Crystallography,

Annamalai Chandrasekaran (Ed.), ISBN: 978-953-307-754-3, InTech, Available from: http://www.intechopen.com/articles/show/title/investigating-macromolecular-complexes-in-solution-by-small-angle-x-ray-scattering

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Patents

1) International patent (United States and Japan) - L. F. Gamarra, et al. Method for isolating exosomes from biological solutions using oxide nanoparticles. PCT PCT WO201021335.

2) Zucolotto, V.; Ciancaglini, P.; Oliveira, O.N.; Santos, F.R.; Prinotto, A.C.; Perez, K.R.; Gimenez, M.C.C.; Stabile, R.G.; Biosensor with digital electrodes for applications in nanomedicine in detection and diagnosis. Patent filed in October 31, 2011, under number 018110042197.

Prizes

SIINCUSP 2011 Prize of Undergraduate Research for the student Mariana Miyagi with the project "Role of the NKT cells in the lung lesions induced by bleomicin". Niels Olsen Câmara.

Honours in the Research Symposium of ICB in the category of "undergraduate research" for the student Felipe Grabarz with the project "The role of physical exercise in the kidney injury induced by cisplatin". Niels Olsen Câmara.

Merit in the category of best doctoral work for the student Enio José Bassi, with the project "Adipose-derived mesenchymal stem cells down-regulate the NFkB signaling pathway in experimental acute kidney injury". Annual meeting of the Brazilian Immunological Society, Foz do Iguaçu, October 2011. Niels Olsen Câmara

Magaldi Prize of the Society of Nephrology of São Paulo with the work "Adipose Tissue Derived Stem Cell Treatment Prevents Renal Disease Progression", with the student Cassiano Donizetti de Oliveira, Congresso Paulista de Nefrologia, São Paulo, October, 2011. Niels Olsen Câmara.

18th Scientific Prize Dr. Odilo Antunes de Siqueira (third classification), Association of medicine of São Paulo, Presidente Prudente, October 2009. Niels Olsen Câmara

High Graded Poster in the World Congress on Inflammation (student Matheus Correa Costa), with the work "Reduction of endoplasmic reticulum stress in ischemia and reperfusion renal injury by heme oxigenase-1 induction1". Niels Olsen Câmara.

Best free theme theme in the area of kidney transplant, with the work “TLR2, TLR4 and MyD88 in experimental model of tubulointerstitial nephritis”, of the student Matheus Correa Costa in the XVI Paulista Meeting of Nephrology, in October 2011. Niels Olsen Câmara.

Best free theme in the area of chronic kidney disease with the work "Adipose tissue derived stem cell treatment prevents renal disease progression”, by the Cassinao Donizetti de Oliveira, in the XVI Paulista Meeting of Nephrology, October 2011. Niels Olsen Câmara.
Scientific Initiation student James Bezerra Gualberto de Souza received an Honorable Mention with the presentation of the paper “Determination of particle size in ferrofluids through measurements of birefringence induced magnetization and magnetic field”, in the 19th International Symposium on Undergraduate Research, University of São Paulo (SIICUSP), from 23 to 25November 2011, on the campus of USP in São Carlos. Advisor: Prof. Dr. Antonio Martins Figueiredo Neto.

(INCT-FCx) Annex II
Education and Dissemination of Science

1- Recycling Course

Coordination : Lia Queiroz do Amaral

The previous annual report described the third edition of the updating course for teachers "Complex Fluids in the high school: properties and applications in physics, chemistry and biology", held in July 2010 in Maringá, state of Paraná. A local team (Paulo Ricardo G. Fernandes and Hatsumi Mukai) was responsible for the demonstrations in the laboratories and also for theoretical classes, completed by 2 members of INCT from São Paulo (L.Q.Amaral and Claudete Justina Valduga). The program of the course had a number of changes with respect to the two previous versions (2007 e 2009).

The Maringá experience was very positive and led to more defined ideas about the text that will be published as a book, probably in 2013, still within the tenure of the INCT:

- it became clear that it will not be a book directed only to high school teachers, since the official program has a well defined curriculum, without space for multidisciplinary focus in Complex Fluids. We therefore started to work aiming at a text for public awareness of science (PAwS) and also public understanding of science (PUS), which could be also used by interested teachers and students, as well as people interested in acquiring a more general knowledge in this multi-disciplinary area.
- new chapters have been added: Foams and Bubbles (Alberto and Adriana Tufaile), Emulsions (Claudete Valduga), and Ferrofluids (Giancarlo E. Souza Brito). Demonstrations developed in Maringá have also been added (Paulo Ricardo and Hatsumi Mukai). These new chapters became ready in 2011 and will be integrated in the final text revision. A new chapter on Phase Transitions is being elaborated by L.Q.Amaral, uniting parts she prepared in 2009 with texts written by Hatsumi Mukai and previously by Thomas Haddad.

The global experience from the 3 editions of the course and from the projects developed by L.Q.Amaral with under-graduated students from USP in 2009/2010 led to the clear result that the subject "Thermodynamics" is the one needing to be better focused at high-school level.

The Teaching Project of this INCT is being presented by L.Q.Amaral at the 2nd Simposium on Teaching of Physics and Mathematics: relation between knowledge and doing - 26 and 27 de April 2012, UNIFRA, Santa Maria – RS.

In 2011 a fourth edition of this updating course was held, financed by the INCT-Fcx, with some additional changes in the program, specially with more emphasis on Ferrofluids.

We took the decision to give this course as one of the mini-courses integrated within a global Project of the Culture and Extension Commission of IFUSP, since this facilitates the bureaucracy with the Secretary of Education of the State of São Paulo.

Dra. Adriana Tufaile (USP Leste) took responsibility of Laboratories, as well as on the organization of the course, together with Dra. Lia Q. Amaral. A team of seven researchers of the INCT were responsible by the classes (Lia Q. Amaral, Adriana and Alberto Tufaile, Lionel F. Gamarra Contreras, Giancarlo Brito, Suhaila Shibli, Paulo Boschcov).

The program of this course, within the II Meeting USP-School, held in the Institute of Physics of USP in the period 18 – 22 July 2011, (40 hours), can be seen in the following Table, where classes specific of this course are given in yellow, with the respective responsible persons.

Programa					
	18 de julho	19 de julho	20 de julho	21 de julho	22 de julho
8h – 09h15	**ABERTURA** Palestra 1 "Reatores Nucleares: valem a pena?" Emico Okuno	**Palestras 2 e 3** "Ensino de Astronomia nas aulas de Ciências" Cristina Leiteou "Escola pública democrática?" Ana Elisa	**Palestras 4 e 5** "Os cadernos de química e física do estado" Ma.Eunice, Maurício, Ivã, Ou "Doença psíquica da criança e do adolescente" Júlio Sawada	"Cristais Líquidos puros e dopados com FF com demonstração" **Suhaila**	AVALIAÇÃO DO CURSO
	Café (10 às 10h30)	Café das 9h15 às 9h30			
9h30-12h30	Estrutura da Matéria Condensada (**Lia**) 10h30 - 12h30	Atividades Práticas com Ferrofluidos (**Adriana e Tufaile**)	Atividades Práticas com Líquidos (**Adriana e Tufaile**)	Atividades Práticas com Espumas (**Adriana e Tufaile**)	Atividades Práticas com displays de LCD e de LED (**Adriana e Tufaile**)
	Almoço das 12h30 às 13h45				
13h45-15h15	Ferrofluidos e aplicações médicas, com visita ao laboratório de pesquisa do Instituto Israelita Albert Einstein, **Gamarra**	Termodinâmica, **Adriana**	Água e Sistemas Aquosos, **Lia do Amaral**	Espumas, **Tufaile**	Fluidos Biológicos, Sangue, Colesterol, **Paulo Boschcov**
15H15-15h30		Café na Sala de Aula		Café na Sala de Aula	
15h30-17h		Ferrofluidos, **Giancarlo**		"Literatura infanto-juvenil: gostosuras e bobices" Fanny Abramovich, **ou** Show da Física	
17h15–19h	*EXTRA* *Seção de cinema e discussão "Nenhum a menos"*	*EXTRA* *Oficina do GT IFUSP-Escola* ***ou** Observação do Céu*	*EXTRA "Grandes possibilidades em peq. medidas: Nanobiotecnologia aplicada na medicina", **Gamarra** e Tatiana T. Sibov – Hosp. A. Einstein **ou** Oficina de Blog 1*	*EXTRA* *Oficina da Voz **ou** Seção de cinema e discussão "Entre os muros da escola" **ou** Oficina de Blog 2*	EXTRA *Sarau do II Encontro*

The course had 4 practical activities in the teaching laboratory (Ferrofluids, Liquids, Foams and Displays), with simple experiments, which were possible to be done by the teachers in their schools. A visit to the research laboratories of the Institute Albert Einstein was made in one afternoon, with detailed explanations and observation of images of optical microscopy in material of research (cells) and ferrofluids.

Theoretical classes, some of them with simple demonstrations in the classroom, were given on several topics of Complex Fluids (Structures of Condensed Matter, Ferrofluids, Thermodynamics, Water and Aqueous Systems, Liquid Crystals pure and doped with ferrofluids, Foams, Biological Fluids, Nanobiotechnology applied to Medicine). Printed material with the course content was given to the attendants.

The course fulfilled its objectives and was well evaluated by the participants (grade 9.4), who asked for its continuation. The high-school teachers the state schools may present the certificate of attendance in this course for improvement in their careers (Authorization published in 20/09/2011).

The fifth edition of this course will be offered in July 2012.

2- Other activities of teaching and disssemination of science

Alberto and Adriana Tufaile at EACH, USP-Leste

Interview by Alberto Tufaile "bubble study helps in the production of equipment for the petrochemical industry". Presentation of radio to disseminate science, Touch of Science, Department of Social Communication, UNESP, Bauru. 04/08/2010.
Podcast: http://www2.faac.unesp.br/pesquisa/lecotec/projetos/toque/podcasts.php?c=340
Channels on Youtube atufaile (Adriana) and altufaile (Tufaile), containing 10 videos of our teaching and research work, some quite popular:
http://www.youtube.com/user/atufaile/videos
http://www.youtube.com/user/altufaile/videos

We propose a project to USP for organizing workshops on science teaching science in Libras (Brazilian Sign Language). The student Rafael Dias Silva is working on the project "Preparation of statements in the form of bilingual Sciences (Portuguese and Libras)". He is a candidate for a scholarship if the project is accepted. The goal is to offer educational workshops on Lobras fpr for public school teachers with a focus on science; practical activities with liquids and complex fluids are part of these workshops.

UFAL

In the last year, we organized at the Physics Institute the Fourth Workshop of UFAL Graduate Program IF / UFAL, under the overall coordination of Professor Italo Nunes de Oliveira, a team member of INCT-FCX. This workshop was attended by nearly 90 undergraduate and postgraduate students from different states of the Northeast, which contributed to the dissemination of the results obtained by the INCT-FCX in the Northeastern community.

In January 2012, there was at UFAL a course on "Methods and Quantum Molecular Simulations," taught by Kaline Coutinho and Sylvio Canuto, from IFUSP. The course included theoretical and practical sessions, with the target audience of graduate students. The course allowed students of IF/UFAL and other institutions to learn the techniques used in the study of organic compounds with biological activity.

In order to meet the recommendations of the steering committee, the researchers of the INCT at IF/UFAL proposed the creation of two courses in the graduate program in physics at IF/UFAL. These courses were called Complex Fluids I and Complex Fluids II, with four credits each, and are intended to increase the number of skilled personnel to conduct research and activities related to complex fluids. These courses will include theoretical and practical sessions, allowing students access to the basic techniques of characterization of liquid crystals, micellar systems, polymers, and colloidal systems.

Group of Complex Fluids at IFUSP

AM Figueiredo Neto: Interviews for radios and TVs on the study of human cholesterol. Participation in the program Globe Science, at Globo TV, talking about this same subject.

Elizabeth Andreoli: The results obtained in the research were presented by students in national meetings (National Meeting of Condensed Matter Physics, LNLS Users Meeting and SIICUSP).

Marcia Barbosa - UFRGS

Participation in the Open Doors of UFRGS
Coordination of the Itinerant Laboratory Technology with Science
http://www.if.ufrgs.br/extensao/palestras-fnac.html - Lecture at Fnac Bookstore
Participation in the Committee that organizes the commemoration of the centenary of Father Landel Moura.
Coordination of the Roundtable on Father Landel de Moura
“Women in Physics”, invited Lecture on Academic Week of the Physics Department of Universidade Federal de Goiás, Goiás, Goiânia, in May 2011.

“Individual Assessment”, invited Lecture at the Second Seminar on the Evaluation of the Brazilian Society of Physics, Brasilia, in May, 2011.
“Women in Physics: Why so few?”, invited Lecture at the Department of Physics, Federal University of Alagoas, Maceió, December, 2011.
“Women in Physics: Why so few?”, invited Lecture at the Workshop Women in Science, Unicamp, Campinas, December, 2011.

Claudette Valduga - UNIBAN

Organization of the VI Workshop on Pharmacy, Bandeirante University of Sao Paulo, with the theme "Biotechnology and Health Innovation."
Exposition of the INCT for undergraduate courses of UNIBAN, resulting in engaging students in scientific initiation and active participation in events organized by the INCT.

Group of UEM - Maringá

Publication of the book:
Perspectives on History of Physics - Vol 1
Luiz Roberto Evangelista
Modern Science Publisher, RJ, 2011, p. 368.
Dissemination activities of the laboratory of complex fluids at the DFI/EMU: Sample of professions, academic weeks Physics (local and regional), scientific meeting of the degree course in physics - the distance mode, lectures at high schools.

Sergio Gomez (UEPG)

The Group on Photothermal Phenomena in Complex Fluids of UEPG has taught short courses on physics and optics of liquid crystals in the Weeks of Physics that are organized annually in our institution. We also encouraged the participation of our students in the summer schools organized by our INCT.

3- Summer School

Sixth Summer School
INCT of Complex Fluids
IFUSP – 6 to 10 February 2012

The Sixth Summer School organized by the National Institute of Science and Technology of Complex Fluids (inctFCx) was held at the Institute of Physics, University of Sao Paulo, in the period from 6 to 10 February, 2012, under the coordination of Professor Cristiano Luis Pinto de Oliveira, a member of the Complex Fluids Group and also at the IFUSP.

The program of this school is given below.

PROGRAM

	06/02	07/02	08/02	09/02	10/02
08:30-09:30	*Opening session* Moshe	Katia	Olivier	Silvio	Presentation of the research groups of the INCT: lines of research, members, equipment
09:30-10:30	Katia	Olivier	Silvio	Heitor	
10:30-11:30	Olivier	Silvio	Heitor	Moshe	
11:30-13:30	Lunch	Lunch	Lunch	Lunch	Final remarks. Granting of Certificates
13:30-14:30	Silvio	Heitor	Moshe	Katia	
14:30-15:30	Heitor	Moshe	Katia	Olivier	
15:30-15:45	**coffee break**	**coffee break**	**coffee break**	**coffee break**	
15:45-17:05	*Alexander Augusto Barbara Bergerson Breno Cássio*	*Danilo Deivid Eraldo Fabiana Geanderson*	*Joern Lucas Priscila Rafael Renata*	*Renato Ronaldo Saulo Thiago Vinicius*	

During this Summer School, invited speakers presented four classes of 1 hour on various topics, as it is listed below. Participating students were asked to submit abstracts for the presentation of seminars and 21 works were selected for presentation. At the end of each day, students presented twenty-minute seminars related to their topics of work (at scientific initiation, M. Sc., and Ph. D. levels).

The speakers and titles of short courses are listed below:

Tabela 1 – Spekers and presented topics

Speakers	Tittles
Moshe Gottieb *(Ben Gurion University, Israel)*	Polymers at interfaces - dynamics and interfacial rheology Thermal effects in magnetic nanoparticles
Olivier Sandre *(Université de Bordeaux/CNRS/IPB , France)*	Magnetic nanoparticles: synthesis, properties and biomedical applications **a.** Chemistry of iron oxides nanoparticles **b.** Magnetic and magneto-optical behaviors **c.** Contrast agents in Magnetic Resonance Imaging **d.** Drug Delivery Systems with magnetic release
Katia Regina Peres *(UNIFESP)*	Calorimetric Techniques applied to biological systems
Silvio Salinas *(IFUSP)*	Elementary statistical models for the behavior of some complex fluids
Heitor Moreno *(FCM - UNICAMP)*	High blood pressure and atherosclerosis

Tabela 2 – Oral presentations of the students

	Name	Tittle	Institution
1	Duarte AR, et al	Estudo da espectroscopia de impedância da água Milli-Q para eletrodos de materiais e espessuras diferentes	Instituto de Física, Universidade de São Paulo
2	Carioca AAF et al	Alterações no metabolismo glicêmico, lipídico e função hepática em idosos com doença hepática gordurosa não alcoólica	Faculdade de Saúde Pública, Universidade de São Paulo
3	Gerbelli BB et al	Estudo cinético de filmes lamelares: Uma analise por GISAXS	Instituto de Física, Universidade de São Paulo
4	Silva BVHV and Evangelista LB	Descrição Contínua de Efeitos de Superfície e Elasticidade de Segunda Ordem em Cristais Líquidos Nemáticos	Departamento de Física, Universidade Estadual de Maringá
5	Oliveira BF et al	Numerical study of coarsening dynamics in two-three-dimensional uniaxial nematic liquid crystal	Departamento de Física, Universidade Federal da Paraíba
6	Alves C and Oliveira CLP	Simulação e Modelagem Computacional do Espalhametno a Baixos Ângulos de Estruturas de Alta Simetria	Instituto de Física, Universidade de São Paulo
7	Oliveira DA et al	Absorption coefficient and order parameter in a reentrant isotropic-calamitic nematic phase transition	Departamento de Física, Universidade Estadual de Maringá
8	Sales SR et al	Atividade antimicrobiana dos extratos etanólicos da casca e folha da Umburana fêmea e parte aérea do Bredo sobre estreptococos do grupo mutans	IMS, UFBA,
9	Sales E, et al	Development of a Two-Dimensional Detector for X-Ray Experiments	Instituto de Física, Universidade de São Paulo
10	Arantes FR et al	Propriedades magnéticas de nanopartículas diluídas em cristais líquidos liotrópicos	Instituto de Física, Universidade de São Paulo
11	Carvalho GA, et al	Distribuição de probabilidades na mecânica quântica não-comutativa.	
12	Kaspersen JD et al	A Small Angle X-ray Scattering study of Outer Membrane-spanning Protein A solubilized with the surfactant Dodecyl Maltoside	Institute of Chemistry, Aarhus University
13	Bello L, et al	Mechano-Optic Effect in Isotropic Phases of Lyotropic Liquid Crystal	Departamento de Física, Universidade Estadual de Maringá
14	Santos PR et al	Thermal di usivity of native and oxidized human low-density lipoprotein solutions studied by using the Z-scan technique	Instituto de Física, Universidade de São Paulo
15	Rubim RL et al	Interactions between lipid membranes	Instituto de Física, Universidade de São Paulo
16	Bicev RN et al	Proteasome:A SAXS study	Instituto de Física, Universidade de São Paulo
17	Guimaraes RR et al	Investigação da dinâmica de defeitos em sistema líquido-cristalino	Departamento de Física, Universidade Estadual de Maringá
18	Lobato RV et al	Formalismo de Wigner na Mecânica Quântica Não-Comutativa	
19	Santos DA et al	Atividade antioxidante de *Aeschynomene martii* pelo sistema β-caroteno/Ácido linoléico.	Instituto Multidisciplinar em Saúde, UFBA
20	Lenzi EK, et al	Behavior of Electrical Impedance of Milli-Q water: an anomalous-diffusion approach	Departamento de Física, Universidade Estadual de Maringá
21	Lenart VM et al	Study of nonlinear optical properties and shape dependence of gold nanoparticles	Universidade Estadual de Ponta Grossa

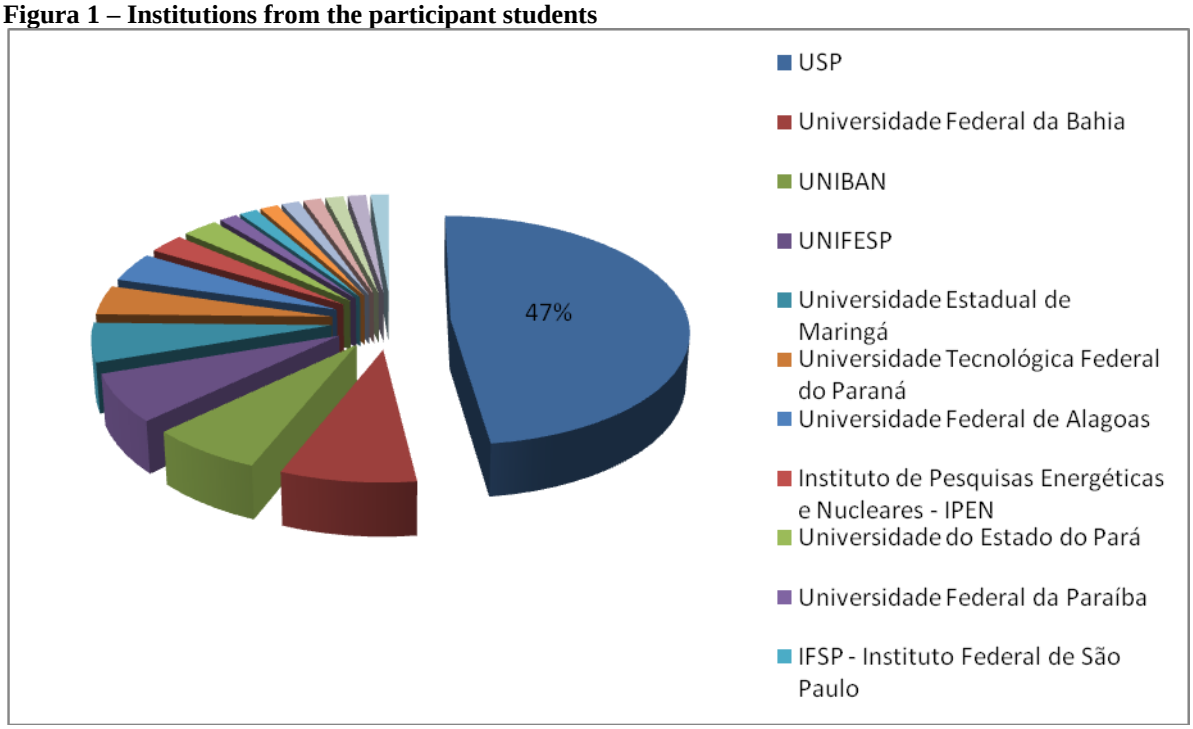
This year we decided to have a smaller number of invited speakers (just five), but each one of them taught four one-hour lectures, so that the topic of interest could be presented in greater detail, which makes the attendance of classes easier for the students.

Two mini-courses were taught in English, presented by Gottieb Moshe (Israel) and Sander Olivier (France). The others were taught in Portuguese. All short courses will be videotaped and made available on the website inctFCx with the material of the lectures. This will allow the participants to see and review the presented lessons and topics.

Among the participants (students), 50% of were physicists, 14% were chemists, 14% were nutritionists, 8% were medical doctors, 9% were biologists, and the remaining students were from engineering and pharmacy. Of the enrolled students, 53% were graduate students form different masters and doctoral programs, and a few postdoctors.

One of the key positive aspects of this school was the heterogeneity of both students and participating institutions. The chart below shows the home institutions of participating students in the school.

Figura 1 – Institutions from the participant students



Both the students and some of the speakers received financial aid for their participation. Students from institutions with INCTFCx members had ful payment of travel allowances and per diem expenses. Students from institutions that are not part of inctFCx had partial payments. The presence of students was controlled in two periods of school and daily delivery of the certificate was subject to a minimum attendance of 75% in the activities of the School. The expenses of foreign participants were fully covered.

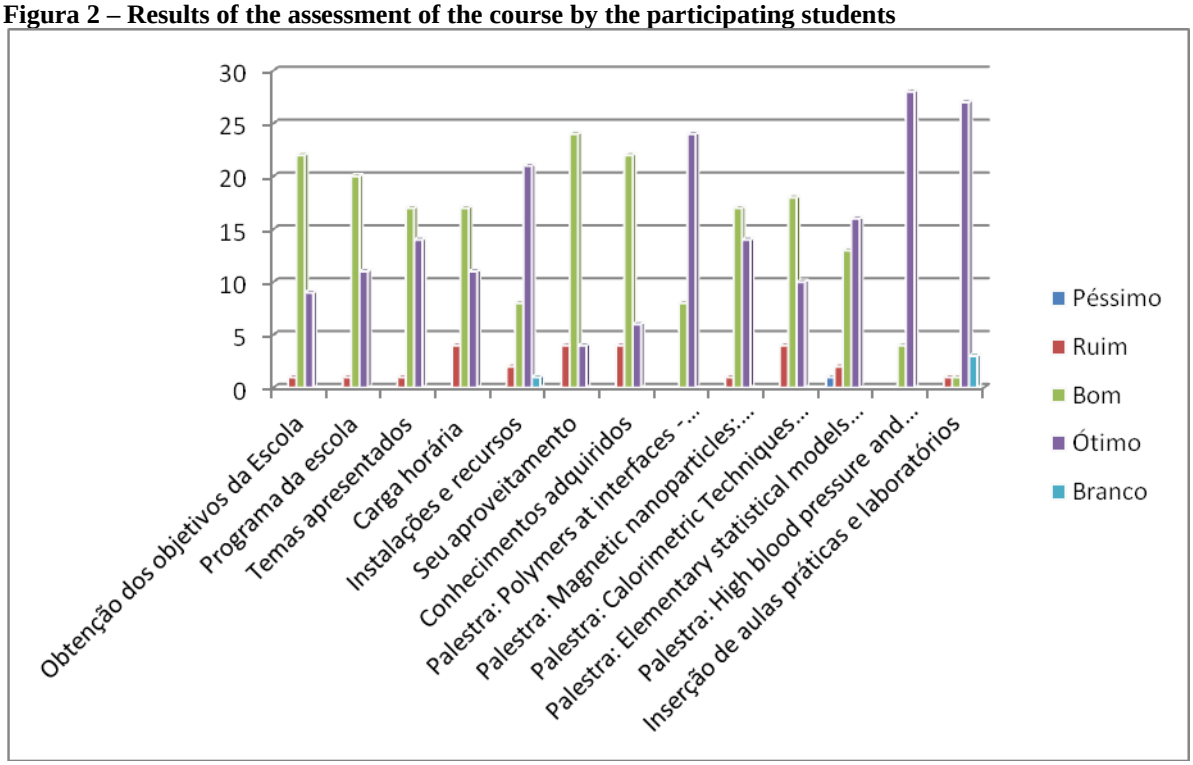
As we mentioned, in this edition of the school we asked the interested students to give an oral presentation of 20 minutes on their research topics. We also gave a certificate for this presentation. This procedure proved to be extremely interesting in view of the quality of the seminars and the related discussions.

During the period of the school, students had the chance to have some contact with INCT researchers from different fields, as well as with the international speakers, allowing the exchange of ideas and discussions on the topics presented.

On the last day of school, we asked the INCT researchers to present briefly their lines of research, members of the group, available equipment, etc.. Five components of the INCT presented their groups and lines of research (Prof. Antonio Neto MF IF / USP, Professor. Cristiano LP Oliveira IF / USP, Professor. Kaline Coutinho IF / USP, Professor. Claudete Valduga UNIBAN J, and the group of Maringá, represented by a Master's student Luke Bello). This initiative was very interesting because it allowed the students participating in school and the invited speakers to have an overview of the groups of the INCT and their research activities.

To have an idea of the impact of schools on the students, we asked them to answer a questionnaire about several aspects of the school. The result is shown below.

Figura 2 – Results of the assessment of the course by the participating students



The result showed a great level of satisfaction of students. The items "great" and "good" were the majority in all questions. This type of survey is very useful to guide the next summer schools.

In conclusion, we believe that this activity should be repeated next year, with similar characteristics as mentioned herein.

Tabela 3 – List of the Participating Students at the Summer School

Nº	Name	Institution	Level	Area	City of Origein
1	Alessandra Fagioli Lima	UNIBAN	Mestranda	Fármacos e medicamentos	São Paulo
2	Alexandre Barros de Almeida	Universidade de São Paulo	Mestrando	FÍSICA	São Paulo
3	Alexsander Ramos Duarte	Instituto de Física da USP	Doutorando	Física	São Paulo
4	Ana Sara Marques	UNIBAN	Graduando	QUIMICA	São Paulo
5	Ângela Sun Li Wu	Faculdade de Saúde Pública da USP	Graduando	Nutrição	São Paulo
6	Antonio Augusto Ferreira Carioca	Universidade de São Paulo	Mestrando	Nutrição	Fortaleza
7	Antonio Egidio de Carvalho	Instituto de Ciências Biomédicas - USP	Mestrando	Física	São Paulo
8	Antonio Rodrigues da Cunha	Instituto de Física da USP	Doutorando	Física	São Paulo
9	Barbara Bianca Gerbelli	Instituto de Física da USP	Mestrando	Física	São Paulo
10	Bergerson Van Hallen Vieira da Silva	Universidade Estadual de Maringá	Graduando	Física	Maringá
11	Breno Ferraz de Oliveira	Universidade Federal da Paraíba	Mestrando	Física	Cabedelo
12	Bruno Cesar dos Santos	Universidade Tecnológica Federal do Paraná	Graduando	Física	Curitiba
13	Bruno Correia Guerrieri	UNIBAN	Graduando	Química	São Paulo

14	Caroline de Oliveira Gallo	Faculdade de Saúde Pública da USP	Graduando	Nutrição	São Paulo
15	Caroline Pappiani	Faculdade de Saúde Pública da USP	Mestrando	Nutrição	São Paulo
16	Cassiana Batista da Rocha	Universidade Tecnológica Federal do Paraná - UTFPR	Graduando	Química	Almirante Tamandaré
17	Cássio Alves	Universidade de São Paulo	Doutorando	Física	São Paulo
18	Célia Regina de Oliveira Bittencourt	Unifesp	Mestrando	Cardiologia	São Paulo
19	Celma Muniz	Universidade Federal de São Paulo	Mestrando	Medicina	Santo André
20	Claudete Justina Valduga	UNIBAN	Pós-Doutorando	Química/farmácia	São Paulo
21	Daniela Melo Tegani Malina	Universidade Federal de São Paulo	Mestrando	MEDICINA	São Paulo
22	Dayany da Silva Alves Maciel	UNIBAN	Graduando	Química	São Paulo
23	Deivid Alan Luz Santos	Universidade Federal da Bahia	Graduando	Biotecnologia; Engenharia Genética; Biofísica; Etc.	Vitória da Conquista
24	Edson Ponciano Rosa	Universidade de São Paulo	Graduando	Física	São Paulo
25	Eduardo Sell Gonçalves	Universidade de São Paulo	Graduando	Física	São Paulo
26	Elisa Yumi Koyama da Silva	Universidade de São Paulo	Graduando	Nutrição	São Paulo
27	Eraldo de Sales	Universidade de São Paulo	Mestrando	Física	São Paulo
28	Evanildo Gomes Lacerda Junior	Universidade de São Paulo	Doutorando	Física	São Paulo
29	Everton Bonturim	Universidade de São Paulo	Mestrando	Química	Embu Guaçu
30	Ewerton Ferraz Andrade	Universidade Federal da Bahia	Graduando	Biotecnologia	Vitória da Conquista
31	Fabiana Rodrigues Arantes	Instituto de Física da USP	Doutorando	Física	São Paulo
32	Fernando da Silva	Instituto de Física da USP	Doutorando	Física	Cotia
33	Flávia De Conti Cartolano	Faculdade de Saúde Pública da USP	Mestranda	Nutrição	São Paulo
34	Geanderson araujo carvalho	universidade do estado do pará	Graduando	física	Ananindeua
	Giusi Valente	Universidade de São Paulo	Graduando	Nutrição	São Bernardo do Campo
35	Helber Holland	Instituto de Pesquisas Energéticas e Nucleares - IPEN	Mestrando	Física/Química	São Paulo
36	Henrique Andrade Rodrigues da Fonseca	Universidade Federal de São Paulo	Doutorando	Biológica/Medicina	São Paulo
37	Jady regina Auada	EEL - escola de engenharia de Lorena -USP	Graduando	Engenharia química	São Paulo
38	Jamile Ramos da Silva	Universidade Federal da Bahia	Graduando	Biologicas	Vitoria da Conquista
39	Jean Michel Antunes de Freitas	IFSP - Instituto Federal de São Paulo	Graduando	Engenharia de Controle e Automação	São Paulo
40	Jørn Døvling Kaspersen	Aarhus University	Doutorando	Nanoscience, Biophysical chemistry	Sao Paulo
41	José Maria Clemente da Silva Filho	Universidade Federal de Alagoas	Mestrando	Física	Maceió
42	Karin Seeder	Instituto de Física da USP	Graduando	Física	São Paulo
43	ki ok joo	Instituto de Física da USP	Graduando	Física	São Paulo
44	Leonardo dos Reis Leano Soares	IPEN	Graduando	Física	São Paulo
45	Lidiane Maria Omena da Silva	Universidade Federal de Alagoas	Doutorando	FÍSICA	Maceió
46	Lucas Bello Gonçalves	Universidade Estadual de Maringá	Mestrando	Física	Maringá
47	Lucas de Arruda Serra Filho	Universidade de São Paulo	Graduando	Física	São Paulo
48	Lucas Modesto da Costa	Instituto de Física da USP	Mestrando	Física	São Paulo
49	Luiz Sampaio Athayde Junior	Nenhuma			Salvador
50	Marcus Vinicius Araujo Damasceno	Universidade de São Paulo	Doutorando	Física	São Paulo
51	Marcus Vinicius Saad de Paula Rodrigues	Universidade de São Paulo	Graduando	Física	São Paulo

52	Maria Camila Pruper de Freitas	Faculdade de Saúde Pública da USP	Graduando	Nutrição	São Paulo
53	Maria Cicera de Brito	Universidade Paulista	Graduando	Nutrição	São Paulo
54	Mariana Sacrini Ayres Ferraz	Universidade de São Paulo	Doutorando	Física	Socorro
55	Matheus Oliveira da Silva	Universidade Federal de Goias	Mestrando	Química	Goiania
56	Otávio Beruski	Universidade Tecnológica Federal do Paraná	Graduando	Química	Curitiba
57	Patricia Azevedo de Lima	Universidade de São Paulo	Mestrando	Nutrição	São Paulo
58	Patricia Nolasco Santos	Universidade Federal da Bahia	Graduando	Biotecnologia	Vitória da Conquista
59	Percíllia Victória Santos de Oliveira	Universidade federal da Bahia - IMS - CAT	Graduando	Biotecnologia	Vitória da Conquista
60	Priscila Ribeiro dos Santos	Instituto de Física da USP	Doutorando	Física	São Paulo
61	Rafael Leite Rubim	Instituto de Física da USP	Mestrando	Física	São Paulo
62	Raquel Aparecida Marques	URN - Universidad Nacional de Rosário	Graduando	Medicina	São Paulo
63	Renata Naporano Bicev	Instituto de Física da USP	Mestrando	Física	Taboão da Serra
64	Renato Ribeiro Guimarães	Universidade Estadual de Maringá	Mestrando	Física	Maringá
65	Ronaldo Vieira Lobato	Universidade do Estado do Pará	Graduando	Física	Barcarena
66	Sara Raquel de Souza Silva	Universidade Federal de Alagoas	Graduando	Física	União dos Palmares
67	Soraia Hani Kasmas	Unifesp	Mestrando	Lipides e aterosclerose e Biologia Molecular	São Paulo
68	Tatiana Helfenstein	Universidade de São Paulo	Pós-Doutorando	física-biologia	São Paulo
69	Thiago Petrucci Rodrigues	Universidade Estadual de Maringá	Mestrando	Física	Maringá
70	Vinícius Mariani Lenart	Universidade Estadual de Ponta Grossa	Doutorando	Física	Ponta Grossa
71	Vivian Vieira	Instituto de Física da USP		Física	São Paulo
72	Vivian Ventura Ferreira Luiz	Universidade de São Paulo	Graduando	Física	Osasco
73	Victoria Pereira Cavalcante	Universidade do grande ABC	Graduando	Medicina Veterinária	São Paulo

Tabela 4 – Invited Participants

Nº	***Reseatcher***	***University***	***Role***
1	Antonio Figueiredo	Universidade de São Paulo - USP	Attendant
2	Moshe Gottieb	Ben Gurion University, Israel	Instructor
3	Claudete J. Valduga	UNIBAN	Attendant
4	Cristiano Oliveira	Universidade de São Paulo - USP	Coordinator
5	Olivier Sandre	Université de Bordeaux/CNRS/IPB , France	Instructor
6	Katia Regina Peres	UNIFESP	Instructor
7	Silvio Salinas	Universidade de São Paulo - USP	Instructor
8	Heitor Moreno	FCM - UNICAMP	Instructor
9	Kaline Coutinho	Universidade de São Paulo - USP	Attendant
10	Maria Tereza M. Lamy	Universidade de São Paulo - USP	Attendant
11	Vera B Henriquez	Universidade de São Paulo - USP	Attendant

(INCT-FCx) Annex III

In this appendix we include the program and the report of the Evaluation Meeting of the INCT-FCX and the program of the Workshop on lipoproteins of 2011.

Evaluation Meeting of the INCT-FCx

The review meeting of the INCT-FCX, held at Hotel Alpino in São Roque, between September 30 and October 2, 2011, was attended by thirty-three researchers, two of whom were guests from other INCTs. There were twenty-three oral communications of the results of several groups, talks of two guests, a report on the activities of teaching, and a brief explanation about the operation of the computational cluster of the Institute. After these presentations, there was a debate on eventual difficulties and the directions to be followed by INCT after the results achieved in these two and a half years of activity (whci correspond to half of the term of the project). An important consequence of this debate was the decision to focus the efforts of all groups that form the INCT around some fundamental guidelines that have been consolidated in the study period (namely, research around the lipoproteins and membranes of ferrofluids). For the maximum effectiveness of these efforts, the group (with the agreement of the Steering Committee) concluded that it is necessary to undertake, as soon as possible, work meetings, with a smaller number of researchers and with focus on these lines. In the end of the meeting there was a plenary session, organized as a round table, so that everyone could speak about the possible contributions of the groups in a more concentrated effort towards the research around these priority lines. It is very important to emphasize that there was a general feeling that meeting was very successful, and that the INCT is strong and coherent, with a perspective of reaching its main goals and challenges.

Briefly, the main deliberations of the meeting were:

1) Focusing the work of the INCT in the next two and a half years on the lines involving the investigations of lipoproteins, ferrofluids and membranes;
2) Organizing a first workshop on lipoproteins in the second part of November, a second workshop on ferrofluids, maybe in December, and a third workshop, on membranes, in the beginning of 2012;
3) Organizing the traditional summer school between 6 and 10 February 2012. Some national and international speakers have confirmed their presence. It was emphasized the need to have a large number of student participants;
4) Organizing courses that are offered to other centers, and creating a course on complex fluids, especially in graduate programs related to the Institute;
5) Increase the use of the website and improve the exchange of information between members of the INCT.

Evaluation Meeting of the INCT – FCx
Hotel Alpino – São Roque
30/09 to 02/10/2011

SESSION I – REVISION OF DATA AND RESULTS – PART 1 - 30/09/2011

14h30min – **Francisco Antonio Fonseca**
Effect of cardiovascular therapy on lipoprotein profile and new vascular parameters

14h50min – **Rosa Elias**
The development of renal injury in experimental models: the role of oxidative stress changes in the endothelium vase

15h10min – **Nágila Raquel Teixeira Damasceno**
Caracterization of LDL and HDL and the association with chronic diseases.

15h30min – **Priscila Santos/Andrea Monteiro**
Physico-biochemical properties of lipoproteins

15h50min **– Lilia Coronato Courrol**
Modification of LDL with ultra short laser pulses

16h10min – **Sérgio Bydlowski**
Lipidi nanoemulsions as a vector for genic therapy

16h30min- 17h00min – **Coffee break**

17h00min – **Barbara Hissa**
Membrane rafts and the role in the entry of Trypanosoma cruzi in non-professional phagocytic cells

17h20min – **Iolanda Cuccovia and Karin Riske**
Amphiphilic systems and model membranes

17h40min – **Amando Ito**
Fluorescence spectroscopy: interaction of drugs and peptides with model membranes lo

18h00min – **Tânia Tomé**
Statistical physics of biologically motivated problems.

18h20min – **Silvio Salinas**
Statistical physics of complex fluids

18h40min – **Antonio Martins Figueiredo Neto**
Structure of cellulose materials

19h00 - Dinner

SESSÃO I – REVISION IF DATA AND RESULTS - PART 2 - 01/10/2011

9h00min – **Kaline Coutinho & Sylvio Canuto**
Modeling of molecular systems of interest in the INCT-FCx

9h20min – **Antonio Martins Figueiredo Neto**
Nonlinear optics of nanopartiocles

9h40min – **Cristiano Luís Pinto de Oliveira**
Applications of scattering techniques to the study of biological systems

10h00min – **Lionel Gamarra**
Research ion ferrofluids in the context of the IIEPAE - INCT-FCx

10h20min – **Adriana Tufaile**
Dynamics of foams, hyperbolic prism, and ferrofluids

10h40min – **Claudete Valduga**
The nanotechnology in the development of pharmaceutical formulations

11h00min – 11h30min – **Coffee break**

11h30min – **Ítalo Nunes de Oliveira**
Advances in the study of the spectroscopic and dynamic properties of complex fluids

11h50min – **Viviana Giampaoli**
Statistical models for the longitudinal data associated with periodontitis

12h10min – **Paulo Ricardo Garcia Fernandes/ Lia Amaral** *Liquid crystals in Paraná and the contribution of the INCT – FCx. Research on liquid crystals and vesicles.*

12h50min – 14h00min **– Lunch**

SESSÃO II– NEW STRATEGIES OF ACTION AND COLLABORATIONS – 01/10/2011

14h00min – 14h30min **– Amando Ito**
Fluorescence correlation spectroscopy and images by time of life: New experimental possibilities.

14h30min – 16h30min – **ROUND TABLE**
Coordinator – **Luiz Roberto Evangelista**

16h30min – 17h00min – **Coffee**

17h00min – 18h30min – **INVITED INCTS**
Coordinator**: Antonio Martins Figueiredo Neto**

17h00 – 17h30min – **Raul Cavalcante Maranhão** – INCOR
Lipoprotein metabolism and use of nanoparticles to transport drugs.

17h30min – 18h00 **– Paulo Miranda –** INCT – Organic Electronics
Nonlinear vibrational spectroscopy of molecules in interfaces, with applications to the study of molecular organization at interfaces..

18h00min – 18h45min – – **Lia Amaral/Adriana Tufaile/Paulo Ricardo Garcia**
Report on the teaching aitivities of the INCT

SESSÃO III – SUMMARY AND PERSPECTIVES – PARTE 1 – 02/10/2011
Coordinator – **Francisco Fonseca**

PROGRAM of the Workshop on Lipoproteins
18/11/2011

Auditório Giuseppe Occhialini (Aud. Sul), Ala Central, Instituto de Física da USP

8.30 – 9.00: Reception with coffee

1º ciclo: Basic aspects and methodologies applied to the study of lipoproteins

9.00 - 9.30: Talk: LDL and its modifications: Dra Tanize Faulin, FCF, USP

9.30 - 10.00: Physical methods for the quantification and characterization of the medications in LDL. Priscila Santos, Ph. D. student, IF, USP.

10.00-10.30: Chemical methods for the quantification and characterization of modifications in LDL. Prof. Claudete Valduga, UNIBAN, São Paulo.

10.30-11.00: Coffee break

11.00-11.30: Image methods for the quantification and characterization of modifications in LDL. Dr. Lionel Gamarra, IIEPAE.

11.30 - 12.00: Investigating structure and states of oligomerization of lipoproteins. Prof. Cristiano Luis Pinto de Oliveira, IF, São Paulo.

12.00- 13.30: Lunch

Clinic and experimental studies of modifeied lipoproteins

13h30-14h00 - Modified lipoproteins in inflammatory diseases. Dr. Andrea Monteiro, IF e ICB, USP

14h-14h30 – Cellular activation by modified LDL. Dr. Francisco José Rios, ICB, USP.

14h30-15h10 – Cardiovascular applications. Prof. Francisco Antonio Helfenstein Fonseca, Course of Cardiology, Department of Medicina, UNIFESP.

15h10-15h30 – Lipidomics and metabolomics – perspectives today - Dr. Edson Lo Turco, Human Reproduction, EPM/UNIFESP.

15.30 - 16.00: Coffee break

16.00 - 16.30: Modifications in other cholesterol transporting proteins. Prof. Raul Maranhão, FCF and INCOR, USP.

16.30 - 18.00: Round Table of integration. Elaboration of proposals of collaboration. Coordinators: Antonio M. Figueiredo Neto, Francisco Antonio Helfenstein Fonseca, Iolanda Cuccovia, and Niels Olsen Saraiva Camara.

Organized by the National Institute of Complex Fluids

Coordinated by Antonio M. Figueiredo Neto, Francisco Antonio Helfenstein Fonseca, and Niels Olsen Saraiva Camara.