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Structural investigations of hair fibers using Small Angle X-Ray scattering.

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Abstract: Human hair has two major morphological regions well distinct: the cuticle and cortex. Between the cells of the cuticle and cortex, cell membrane complexes (CMCs) are present, consisting of lipid layers and bilayers. The main function of the cuticle, the outer structure, is to provide mechanical protection for the cortex[1], which contains a helical fraction comprising a crystalline phase (intermediate filaments - IFs) embedded in amorphous matrix filaments that is sensible to water[2], largely influenced by the relative humidity. High temperatures can induce changes in the hair structure and it is possible to relate [3, 4, 5] the use of small angle x-ray scattering (SAXS) measurements to evaluate the changes in the IFs in the cortex, lipid molecules in the CMC and damages caused to the hair. In this context, we initiate a study in order to *investigate dehydration* and denaturation effects on untreated human hair by heating. In situ SAXS measurements (from 30 Celsius to 300 Celsius) were performed and compared to differential scanning calorimetry (DSC) data. As will be shown, important features seen in the DSC scans could be related to changes in the SAXS patterns, allowing the correlation between the enthalpy variation and structural temperature induced changes.

Key-words: human hair, SAXS, structure.

Support: CNPq, FAPESP, INCT-FCx.

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