Multitechnique approach to the study of denaturation processes of globular proteins

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It is known from literature that a huge number of globular proteins like lysozyme have excellent heat-induced gelation properties [1]. However, the molecular mechanisms underlying the aggregation of globular proteins have not been deeply elucidated, due to their intrinsic complexity. A step forward to the understanding of the molecular mechanisms of protein aggregation is the study of the co-aggregation phenomena. On one side, the comprehension of the molecular mechanisms that lead to the formation of amyloid fibrils could help to develop drugs able to inhibit these processes, as amyloid aggregates are involved in several degenerative diseases [2]. On the other side, the protein's self-assembly and co-aggregation phenomena can be exploited to the formation of new intelligent nanostructured materials, which find application in various scientific sectors such as tissue engineering and food industry [3].
Here, the thermal aggregation process of both human albumin and human lysozyme pure solutions have been investigated, focusing on the co-aggregation mechanisms between the two globular proteins, mixed at different molar ratios. The thermal unfolding, self-assembly and co-aggregation processes have been investigated through a multitechnique spectroscopic approach. Molecular information i.e., the protein's conformation evolution and the formation of intermolecular β-sheet aggregates (peculiar of amyloid interactions), are obtained by Circular Dichroism (CD) and Fourier Transform Infrared (FTIR) spectroscopies. Instead, Dynamic Light Scattering (DLS) technique has employed to obtain size distribution and morphological information of protein's monomers and their aggregates.

References:

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