NEW IN LUMINESCENCE IN AMINOACIDS AND PROTEINS

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Amino acids, the basic building blocks of proteins, provide a wide variety of electrical and optical properties of natural proteins. It is generally accepted that the main contribution to protein luminescence comes from aromatic amino acids such as phenylalanine, tyrosine, and tryptophan, which contain a fragment with conjugated double bonds in their structure. However, it has recently been shown that non-aromatic amino acids in their aggregated form can also produce a fluorescent signal that is not observed in their monomeric state. Autofluorescence of non-aromatic amino acids is an enigmatic phenomenon with great potential in biophotonic applications, the physical origin of which remains unclear. Recent data indicate that this type of fluorescence occurs not only in amino acids, but is, in fact, a common property of many other natural and organic compounds [1].

In this paper, we investigate the radiation properties of non-aromatic amino acids in concentrated solutions. The study was conducted with aqueous samples of L-Arg HCl, L-Lys HCl and Gly using vibrational (FTIR) and optical spectroscopy in the UV-visible region. The paper presents data confirming that electronic interactions between non-absorbing and non-fluorescent molecules in the monomeric state can lead to optically active states due to the formation of supramolecular entities. It was also shown that L-Arg HCl, L-Lys HCl and Gly samples in aqueous solution are capable of simultaneously emitting fluorescence and afterglow when excited by UV-visible light at room temperature, which is rare even for organic dyes. The luminescence afterglow differs from normal fluorescence by its weak intensity and long emission duration. The obtained data indicate the dual nature of fluorescence and the existence of excited states and emitting species of different nature. The specificity of stable delayed fluorescence with the values of the maximum and spectrum shape characteristic of normal fluorescence corresponds to thermally activated delayed fluorescence.

References.

1. Y. Hong, J. W. Y. Lam and B. Z. Tang, Aggregation-induced emission: Phenomenon, mechanism and applications// Chem. Commun., 29, 2009. Pp. 4332-4353.