

Fluorescence time decay of 1,2-Indanedione-arginine and applications

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The fluorescence spectrum of the reaction product of 1,2-indanedione, a fingerprint reagent [1-3], with amino acid L-arginine (Arg) was measured in water-methanol solutions at room temperature. Dissolved Arg in ultrapure (18.2 M Ω -cm) water was mixed with a methanol (4.10-3M) solution of 1,2-indanedione (50%V/50%V). When the reaction was complete, we measured the excitation, emission and time-resolved fluorescence of the samples at room temperature. The fluorescence of the product is a broadband spectrum having its maximum around 530 nm with a half width of about 50 nm [4]. The fluorescence time decays for the mixture product were calculated using one, two and three exponential fits. The data were analyzed using the linear least squares and logarithmic fit procedures. The best fit was achieved with the three exponential decay law. From the resolution of multi-exponential decay laws, fluorescence decay lifetimes of the fluorescent species were obtained: $\tau_1 = 0.653$ ns with a S.Dev = 0.046 ns; $\tau_2 = 2.962$ ns with a S.Dev = 0.011 ns; and $\tau_3 = 7.100$ ns with a S.Dev = 0.168 ns. These results can be used for gender determination from fingerprint residue by comparing the intensities of the fluorescence peaks in the same experimental conditions [4]. For instance, the concentration of amino acids (AAs) in females fingerprints residues is almost the double of the concentration of AAs in males [5] and, consequently, fluorescence peak of 1,2-indanedione-L-arginine in females will be at least two times higher than those from males. In this way, the investigations in a justice case, for example, are reduced by almost 50%.

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