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Time-resolved fluorescence spectroscopic study of flavin fluorescence in purified enzymes of bioluminescent bacteria ELENA VETROVA, Texas Tech University, N. KUDRYASHEVA, Krasnoyarsk State University, K. CHENG, Texas Tech University — Time-resolved fluorescence intensity and anisotropy decay measurements have been used to study the environment and rotational mobility of endogenous flavin in two purified enzymes of bioluminescent bacteria, Luciferase from *Photobacterium leiognathi* and NAD(P)H:FMN-oxidoreductase from *Vibrio fischeri*. We compared the time-resolved fluorescence parameters, intensity decay lifetimes, rotational correlation times, and their fractional contribution, of the endogeneous flavin fluorescence in each of the two enzymes in the presence or absence of quinones of different structures and redox potentials. The endogeneous flavin exhibited multi-exponential decay characteristics as compared to a single decay lifetime of around 5 ns for free flavin, suggesting a complex and heterogeneous environment of flavin bound to the enzyme. In addition, a significant increase in the rotational correlation time and a certain degree of ordering of the molecule were observed for endogenous flavin when compared to a single and fast rotational correlation time of 150 ps of free flavin. Quinone significantly altered both the lifetime and rotational characteristics of endogenous flavin suggesting specific interactions of quinones to the endogeneous flavin in the bacterial enzyme.

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