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**Ultrafast studies of flavins and flavoproteins**

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Flavin molecule plays an essential role as a cofactor in flavoproteins with its rich redox states. We have systematically studied the excited-state dynamics of three different redox states (oxidized, semiquinone, and fully reduced) in bulk solvent and in some important proteins. A series of new results were obtained and a correlation of structure-redox-dynamics-function in proteins was observed. We use two important proteins, photolyase and flavodoxin, to show these significant findings.