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Ultrafast dynamics explaining pH probe mechanism in borondipyrromethene-benzimidazole compound

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New borondipyrromethene (BODIPY) compounds containing protective, formyl and benzimidazole groups at meso position were designed and synthesized targeting pH probe application. Absorption and emission properties of these three compounds were investigated as a function of solvent and H⁺ concentration. The novel BODIPY compound with a benzimidazole moiety showed drastic fluorescence quenching upon increasing protonation, which can be used as an evidence of pH sensing property. Ultrafast pump probe spectroscopy experiments as well as density functional theory (DFT) calculations proved that the fluorescence quenching of this compound under acidic conditions is associated with photoinduced electron transfer (PET) mechanism. These results revealed the benzimidazolium cation formed as a result of protonation of the pyridinic nitrogen of the benzimidazole moiety to act as an electron-accepting group, whereas BODIPY tended to act as the electron-donating group. Experimental results proved that this novel BODIPY compound with the benzimidazole moiety is a good candidate for pH probe applications. Revealing the underlying mechanism of fluorescence quenching upon protonation using ultrafast spectroscopy techniques may open a new path to the design and preparation of novel fluorescence pH sensors.

Biography

Halime Gul Yaglioglu has completed her PhD from Electrical Engineering Department of The City College of The City University of New York in 2001 and worked as an Optics Developer for Lucent Technologies Inc. for about four years. She has joined Ankara University Engineering Physics Department in Turkey in 2005 as an Assistant Professor. She has been working in the same department as an Associate Professor since 2011. She has published more than 32 papers in reputed journals.

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