Spectral control of 2-arylimidazopyrazinone derivatives: substituent effect and an interaction with biological molecules

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Imidazo[1,2-a]pyrazin-3(7H)-one (imidazopyrazinone) derivatives are important biomolecular and chemiluminescent compounds as a sensor molecule. In addition, we found that imidazopyrazinone derivatives showed the solvatochromic shift of the absorption bands in the visible region. This solvatochromic property originates from the characteristic π-electronic structure of the imidazopyrazinone ring system, which has a twitter-ionic character. In particular, 2-phenyl derivatives have electronic absorption bands in the red region on account of an expansion of the π conjugated system, and it is easy to recognize the solvatochromism with the naked eye. Since the solution colors of imidazopyrazinone derivatives are changeable with depending on solution conditions, imidazopyrazinone derivatives are useful in order to design a novel photofunctional dye for the biological imaging. On the basis of this idea, we have investigated the spectroscopic properties of 2-arylimidazopyrazinone derivatives systematically. In this paper, we focus on the substituent effect of 2-arylimidazopyrazinone derivatives in order to control the π electronic character. From the results of this study, we could expand the color range of the solvatochromism. We will also report the spectral changes of 2-arylimidazopyrazinone derivatives induced by a supermolecular interaction with biomolecules.