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## Spectroscopic interaction of TiO<sub>2</sub> NPs with a novel biologically active 3(2H)-pyridazinone derivative: A Fluorescence Quenching Study

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The effect of titanium dioxide (TiO<sub>2</sub>) nanoparticles (NPs) concentrations on spectroscopic measurements for a novel 3(2H)-pyridazinone; 5-(5-bromo-2-hydroxy-phenyl)-2-phenyl-2H-pyridazin-3-one (BHP) molecule in ethanol solvent has been investigated using UV-Visible spectrophotometer, fluorescence spectrophotometer and time correlated single photon counting techniques at room temperature. The values of absorption, fluorescence intensity and fluorescence lifetime of BHP molecule decreases with increase in TiO<sub>2</sub> NPs concentration. The association constant ( $k_a$ ) of BHP molecule with TiO<sub>2</sub> NPs in the ground state is estimated using the Benesi-Hildebrand relation. A linear Stern-Volmer (S-V) plot is obtained in steady state and transient state studies. In addition, we have estimated the binding constant and number of binding sites. Results revealed that there is a strong interaction between investigated molecule with TiO<sub>2</sub> NPs, fluorescence quenching in the said system is purely dynamic in nature and also there exist one binding site in BHP molecule for TiO<sub>2</sub> NPs. Furthermore, we studied the energy transfer in fluorescence quenching by the Forster's non-radiative energy transfer (FRET) theory it reveals that there is an energy transfer from BHP molecule to TiO<sub>2</sub> NPs. The results of present investigations may shine in variety of applications, such as to sensitize the TiO<sub>2</sub> for solar energy conversion and biological sensing etc.

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