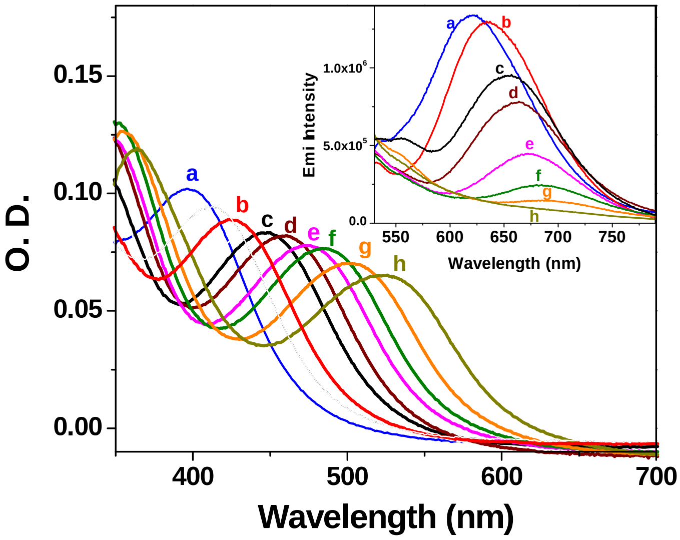
**Supporting Information:**

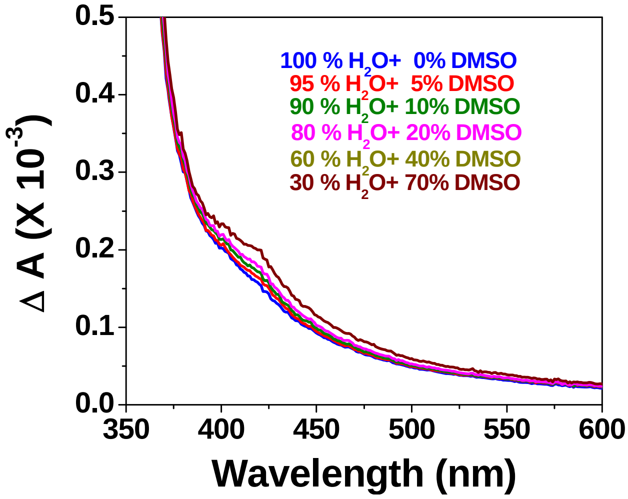
**Solvatochromic properties complex 1 in water: DMSO mixtures:**




**SI Figure 1: Solvent sensitivity of the lowest-energy absorption band of $K_2$[Ru(bpy-cat)$(CN)_4$] in various dmso–water mixtures; pure water is 0, pure dmso is 1. Inset: Steady state emission spectra complex 1 in a) water b) 20% DMSO c) 30% DMSO d) 50% DMSO e) 60% DMSO f) 70% DMSO g) 90% DMSO in water and h) in DMSO solvent mixtures.**

From the above Figure we can see clearly the solvent sensitive properties of complex 1. With increasing the volume ratio of DMSO we can see clearly the optical absorption spectra move drastically towards red direction. The lowest-lying $^1$MLCT absorption maximum ($\lambda_{\mathbf{abs}}$) shifts from 396 to 526 nm on passing from neat water to neat DMSO. The luminescence spectra of **1** in various dmso : water mixtures are shown in the above Figure exciting at 450 nm. We can see clearly the emission maxima appears at 620 nm in pure water gradually shifted towards red region of the spectrum. We have also observed that emission quantum yield also decreases gradually with the increment of DMSO contribution and in neat DMSO the MLCT emission band practically vanishes.

**Optical absorption studies of complex 1/$TiO_2$ in water: DMSO mixtures:**




**SI Figure 2:** Optical absorption spectra of complex **1** on $TiO_2$ nanoparticle surface in water: DMSO solvent mixtures. Concentration of $TiO_2$ kept 15g/L.

SI Figure 2 depicts the optical absorption spectra of **1**/$TiO_2$ system in water: DMSO solvents mixture. It is interesting to see that the optical absorption of **1**/$TiO_2$ system does not change much with varying solvent composition. It clearly indicates that coupling between **1** and $TiO_2$ which takes place through catecholate binding does not change due to solvent composition. If the coupling would take place through CN group then it would definitely affect in high DMSO solvent composition.