Up-conversion Luminescent Switch Based on Photochromic Diarylethene and Rare Earth Nanophosphors

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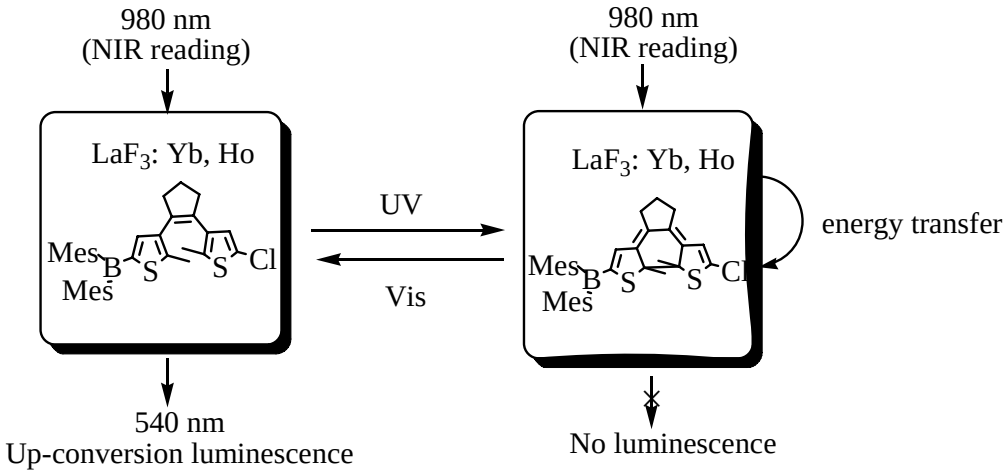
Diarylethene derivatives (DTEs) are the most promising photochromic materials because of their notable irreversible thermal photochromic behaviour, high photoisomerization quantum yields and outstanding fatigue resistance. For practical applications in high density data storage systems, nondestructive readout capability is indispensable. The up-conversion luminescence of **1** / LaF_3:Yb,Ho nanoparicles loaded PMMA film pumped with 980 nm diode lasers shows the emission peaks mainly located at 540 and 645 nm, respectively. It is obvious that the up-conversion luminescence of LaF_3:Yb,Ho nanoparicles significantly overlaps the absorption band of the photostationary state (PSS) of **1** and therefore can be effectively quenched by the PSS of **1** through an intermolecular energy transfer process from LaF_3:Yb,Ho nanoparticles (energy donor) to the closed state of **1** (energy acceptor) upon irradiation with UV light. Scheme 1 shows the fundamental principle of the up-conversion luminescent switch. What is more important is that **1** has zero absorbance in the near-infrared region, so this nondestructive up-conversion luminescent switch process, excited by near-infrared light (980 nm), is performed perfectly.



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