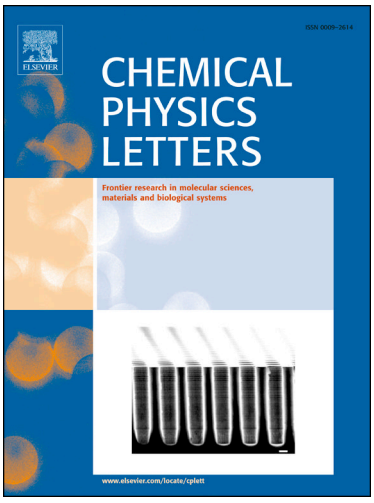

Research paper

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Dipak Kumar Das, Krishnandu Makhal, Debabrata Goswami

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Solvent effect on multiple emission and ultrafast dynamics of higher lying excited states

Dipak Kumar Das[1], Krishnandu Makhal[1], Debabrata Goswami[1]*
Department of Chemistry, Indian Institute of Technology Kanpur, Kanpur- 208016, Uttar Pradesh, India
E-mail:- dgoswami@iitk.ac.in

Abstract:

We present ultrafast-depopulation-dynamics of higher-lying-excited-states using femtosecond fluorescence up-conversion techniques for two near-infrared (NIR) tricarbocyanine dyes (IR144 and IR140) in primary alcohols. With visible excitation wavelengths, such dyes show two distinct emission-bands with large peak wavelength difference: one at the visible region: $S_2 \rightarrow S_0$, and the other at NIR region: $S_1 \rightarrow S_0$. We show that exact band-positions, intensities, and fluorescence-decay-timescales (τ) depend strongly on viscosity and polarity of solvents. Interestingly, though the faster component of τ increased for IR144 with increasing viscosity and chain-length of alcohols, the reverse was seen for IR140, indicating the possible formation of ion-pair of IR140 with alcohols.

Introduction:

Two tricarbocyanine dyes, namely, IR144 and IR140, are popularly used for research work due to their very high absorption cross-sections at 800 nm and large solvent dependent Stokes shifts[1]. Strong fluorescence emission of these two dyes has made them useful for bio-imaging applications in the biological transparent window (BTW) region[2], [3], [4] (650-900 nm) in comparison to the other NIR dyes as they have lesser photodamage, lesser light scattering and