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Synthesis of imine-linked two dimensional porous organic polymers exhibiting excited-state intramolecular proton transfer properties

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The synthesis and photophysical properties of three tris(*N*-salicylideneaniline) (TSA) compounds containing 1,3,5-triarylbenzene (TAB), -tristyrylbenzene (TSB) and -tris(arylethynyl)benzene (TEB) core units were studied. The TSA compounds underwent efficient excited-state intramolecular proton transfer (ESIPT) in solution and in solid state due to the preformed C=N...H₂O hydrogen-bonded motifs of the structures. Steady-state fluorescence emission spectra of the TSA molecules revealed dual bands only in DMSO and large Stokes shifts in other polar aprotic and protic solvents. Femtosecond transient absorption spectroscopic measurements in THF revealed lifetime values in the range of 14-16 ps for the excited-state keto-tautomer. The TSA compounds are also responsive to metal ions (Cu²⁺ and Zn²⁺) in DMSO and exhibit enhanced aggregate-induced emission (AIE) properties in DMSO/water mixture. Three tris(*N*-salicylideneaniline)-based imine-linked 2D-porous organic polymers (POPs) using the same C₃-symmetric TAB, TSB and TAE amines were synthesized that exhibit reversible type IV isotherms, which is indicative of their mesoporosity. These TSA-POPs also exhibited ESIPT emission and responsive to Cu²⁺ and Pd²⁺ making them potentially useful as fluorescent-based chemosensors.

Biography

Pradeepkumar Jagadesan is currently a postdoctoral researcher at the University of Texas-San Antonio, working under Professor Kirk Schanze in the area of conjugated polyelectrolytes and organic frameworks exhibiting non-linear optical properties. Dr. Jagadesan obtained his PhD from the University of Miami (UM), Florida, where he developed his expertise in the area of supramolecular photochemistry under the supervision of Professor V. Ramamurthy. Later he moved to The Ohio State University and worked as a postdoctoral researcher under Professor Psaras McGrier, where he synthesized the first porous organic polymer that exhibited the excited state intramolecular proton transfer (ESIPT) luminescent property. He was recently awarded the prestigious "DST-INSPIRE Faculty award" by the Ministry of Science and Technology, Government of India. During his graduate studies he was awarded the "Outstanding Teaching Award" (2015), "Perpetually Outstanding Teaching Award"(2013) and "Lifetime Teaching Assistant Award"(2011) by the department of chemistry, UM.

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