Facile preparation of TICT@MOF solids with unprecedented PL quantum yields

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Abstract
Luminescent solids have unique optical properties. An important goal is to realize a simple procedure to lighten up weakly emissive hybrid inorganic-organic solids. Here we demonstrate that the instant mixing of (1-cyano-2-[α-terthiophen-2-yl]-vinyl)carboxylic acid (3TCC) with the metal-organic framework MOF-177 in an organic solvent followed by the evaporation of that solvent conceived solids with distinct photoluminescence (PL) properties, turning over the PL quantum yields (PLQY) of the generated 3TCC@MOF-177 solids by ~2 to 40 folds compared to the 3TCC solution. The anisotropic rotational times of 3TCC@MOF-177 solids (e.g., 0.14, 0.41, and 0.51 ns) inversely correlate with their PLQY values (e.g., 65, 42, and 32%) depending on the protic solvent used in the initial preparation step in the following order: methanol > ethanol > butanol. The behavior is explained kinetically and thermodynamically. These observations offer new solid with a remarkable PLQY that was easily achieved using an effortless approach.

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