

Nanocrystalline MOFs for Nano-Platform

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Metal-organic frameworks (MOFs) are typically synthesized into pure and bulk-sized crystals, and thus their usability is limited by the lack of compatibility with advanced technologies. Strategies to intermingle reticular chemistry and nanotechnology will lead to new forms of functional materials and applications. This talk will show how MOFs and nanotechnology can be combined into special constructs and successfully work together for bioimaging and solar cell applications.

In bioimaging application, molecular dyes protectively encapsulated within close-fitting pores of nanocrystalline metal-organic frameworks open up opportunities to utilize molecular probes in biomedical applications. For the solar cell application, nanocrystalline Ti-based metal-organic framework (nTi-MOF) particles (ca. 6 nm) are synthesized and successfully used in perovskite solar cells (PSCs) to result impressive power conversion efficiencies of 18.94% and 17.43% for rigid and flexible devices, respectively. These results suggest that the nTi-MOF has a great potential for the design of highly flexible architecture in PSCs with excellent device performance.