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Abstract: Light-responsive materials are attracting increasing amount of attention and have great potential in many research fields in environmental chemistry, materials science, biology, and nanotechnology. In this work, UiO-66-NH_2/Ag_3PO_4 (UAP-X) Metal-organic framework (MOF)-nanoparticle composites with remarkable adsorption performance toward sulfamethoxazole (SMX) were reported. In addition, visible light-triggered release of SMX in the UAP-X composites was reported for the first time. It is believed that the light-triggered desorption of SMX is due to the transformation from Ag^+ to Ag^0 in the light-sensitive Ag_3PO_4 nanoparticles (NPs) of the composites. The SMX release performance of UAP-X can be tuned by the size of Ag_3PO_4 NPs distributed on the UiO-66-NH_2. Specifically, the smaller crystal size of Ag_3PO_4 NPs, which can facilitate the reduction of Ag^+ to Ag^0, can be achieved with an increase in relative UiO-66-NH_2 content in the composites. In addition, the higher UiO-66-NH_2 content of the composite could provide more deposition area to minimize the aggregation of Ag_3PO_4, which could further enhance the reduction of Ag^+. The light triggered desorption provides new possibility to achieve pollution-free and low-cost recyclability of adsorbents.

Key words: light-response, MOF-nanoparticle composites, desorption, UiO-66-NH_2, PPCPs, mechanism

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