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Structures, photoluminescence and photocatalytic properties of two novel metal–organic frameworks based on tetrazole derivatives

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Photocatalysis, as a "green" technology, has been widely applied in the treatment of solar water splitting, purifying air, and eliminating the organic contamination of water. In past decade, the development of solid photocatalysts are mainly focus on the semiconductor metal oxide, sulfide particles and so on. More recently, a few contributions about new photocatalytic materials based on MOFs are successively accomplished, which indicated that this area is a new application for MOFs materials and also an alternative strategy to develop novel photocatalysts. Because MOFs could become to a versatile and potentially tunable photocatalyst, which is achieved by changing the organic linkers and transition metal centres to form different ligand-to-metal charge-transfer (LMCT) transitions. However, such kinds of applications of MOFs are just to emerge. And inexpensive, stable, efficient novel photocatalysts based on MOFs still need to be continuously developed with great effort.

On the other hand, one of the most popular metals employed in the construction of MOFs has been silver(I).13 This d10 metal is particularly versatile in its coordination number, geometry and applied properties, but rarely emerging in the MOFs built by tetrazolates and its derivatives. Considering the above points, we design and synthesis two novel Ag(I)-based MOFs from 5-aminotetrazolate and 5, 5′-azotetrazolate and evaluate their performance as efficient photocatalysts in decomposing the organic dye R6G. The thermal stabilities and photoluminescent properties of these two compounds are also investigated.

Keywords: silver, organic dyes, metal-organic framworks, photocatalysts, photoluminescence