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Enhanced adsorption and photo catalytic performance of ZnO/MIL-101(Fe) under UV and visible light irradiation

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Metal Organic Frameworks (MOFs) have recently debuted as participants and solid supports in catalysts for water treatment. Their high surface area, porosity and structural versatility offer a tantalizing consolidation of the components needed for the adsorption and solar light harvesting ability. A novel type of nanocomposites; ZnO/MIL-101(Fe) was synthesized via a hydrothermal method by loading ZnO on a porous metal-organic framework, MIL-101(Fe). The synthesized catalysts ZnO, MIL-101(Fe) and ZnO/MIL-101(Fe) were characterized by XRD, TEM, FTIR, UV-Vis diffused reflectance spectroscopy, zeta potential and N2 adsorption-desorption measurements. The resulting MIL-101(Fe) and ZnO/MIL-101(Fe) nanocomposites with enhanced adsorption and solar light harvesting ability exhibited improved photo-activity towards degradation of Rhodamine B dye (RhB) as a model pollutant under visible and UV light irradiation. The band gap energy of ZnO was 3.2 eV restricting its activity under UV light only. However, the loading of ZnO on MIL-101(Fe) decreased the band gap to be 2.85 eV in case of ZnO/MIL-101(Fe), explaining the obtained activity order; degradation under visible light>UV light>adsorption. It can be concluded that the synthesized ZnO/MIL-101(Fe) could be used as alternative catalysts for photo catalytic decolorization of colored wastewater as it can successfully degrade Rhodamine B to approximately 97% in 300 min.

Biography

Rasha S Mohamed has completed her PhD from Ain Shams University, Egypt. She has published 5 papers in reputed journals. She has been working in preparation of nanocatalysts, silica, alumina and metal-organic frameworks.

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