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Entitled

SYNTHESIS, CHARACTERIZATION, and PHOTOCATALYTIC ACTIVITY of PHOTOACTIVE MOFs and M-HOF SIMULATED VISIBLE LIGHT IRRADIATION

by
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Date & Venue
2:00
Friday, 1 Jun 2023
Room 0040, F3 Building

Abstract

The increasing global energy demand has resulted in environmental issues, leading to a shift in research towards sustainable and renewable energy sources. Among these, solar energy is the most abundant natural resource available. One of the most profitable ways to utilize sunlight is through chemical transformation using photocatalysts. In this regard, we reported the synthesis of different stable porous materials, such as metal-organic frameworks (MOFs) and metal hydrogen-bonded organic frameworks (M-HOFs). The MOF photocatalysts are bismuth-gallate (Bi-gallate), a mixed ligand manganese-based MOF (MnII3(tp)6/2(bpy)2.(dmf)) and a new hexagonal layer manganese MOF compound named UAEU-50, while the HOF is Co-HOF. These materials were characterized using various spectroscopic and analytical techniques (e.g., powder X-ray diffraction (PXRD), single-crystal X-ray diffraction (SC-XRD), UV-Vis diffuse reflectance spectroscopy (DRS), thermogravimetric analysis (TGA), Fourier-transform infrared spectroscopy (FT-IR), scanning electron microscopy (SEM), and energy-dispersive X-ray spectroscopy (EDX)). Chemical and thermal stability were also tested. Then, these photocatalysts were used in photocatalytic reactions such as synthesis of several cyclic carbonates using cycloaddition of CO2 to epoxides and aerobic oxidation of benzylamine to N, N-benzylidenebenzylamine. The selected robust compounds exhibited high thermal and chemical stability, as well as high photocatalytic performance.

Keywords: Photocatalyst, Mn-MOF, Bi-MOF, CO_2 utilization, cyclic carbonates, benzylamine visible light, UAEU-50, $Mn^{II}_3(tp)_{6/2}(bpy)_2$.(dmf), Co-HOF.