

Green synthesis of bismuth molybdate and its composites for enhanced photocatalytic applications

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Abstract: In the recent years, the rapid industrial development and population growth have led to increasing environmental pollution and serious energy shortages. In the recent past, due to the excellent optical properties and synergistic effect, bismuth related compounds such as BiOX, (X= Cl, Br and I), BiVO₄, Bi₂MoO₆ etc. have gained significant attention in the field of photocatalysis.

Herein, we demonstrate a green leaf extract intermediated hydrolysis method for the synthesis of green Bi₂MoO₆ and its composites. The phytochemicals rich contents of the leaf extract demonstrated natural stabilizing properties, which effectively controlled the size of the composites and ultimately enhanced the specific surface area and porosity of the samples. Meanwhile, the leaf extract also proved to be an excellent dye sensitizer for the composites that boosted the optical window of the green samples for high level of solar energy harvesting. Furthermore, the photocatalytic activity of the as-prepared green Bi₂MoO₆ and its composites was measured and compared with Bi₂MoO₆ synthesized by hydrolysis route without the leaf extract.

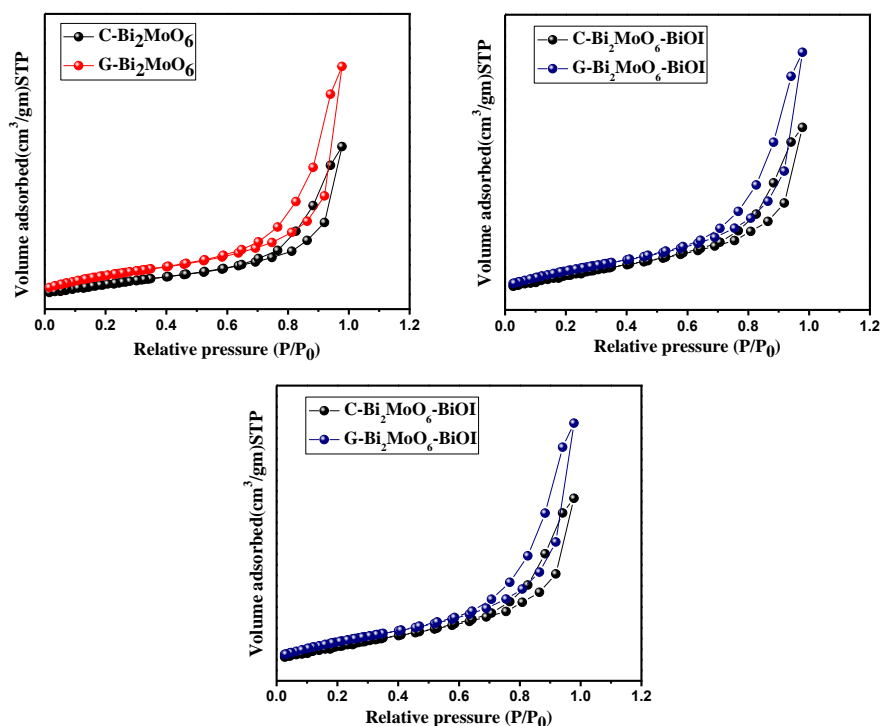


Figure 1: Schematic representation of the BET specific surface area of the Bi₂MoO₆ and its composites.

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The green samples exhibited much improved photocatalytic performance than the chemical one for methyl orange (MO) degradation under visible light irradiation. The enhanced photocatalytic activity was mainly attributed to the electron accepting π -conjugated system offered by the complex structural constituents of the leaf extract, thereby facilitating the charge transfer process and efficient separation of photogenerated electron-hole pairs.

References:

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