

## Bismuth based photocatalyst for efficient photodegradation and CO<sub>2</sub> reductions

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### Abstract

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Nano photocatalysts (BiOXs, Bismuth Molybdate, Bismuth Titanate and their composites) have been successfully synthesized using hydrolysis method. To obtain a better understanding of the results, the Bismuth based material and their composites were also immobilized on Alumina (Al<sub>2</sub>O<sub>3</sub>)-based ceramic fiber sheet and activated carbon block as supporting material. The results revealed that the higher pH value was more favorable for bisphenol A (BPA), Amoxicillin (AMX) and Ampicillin (AMP) degradation, while the MO was completely degraded at all pH range. Moreover, the stability test was performed, and high stability of the immobilized samples was observed for five cycles without leaching out in the aqueous medium.

Carbon dioxide hydrogenation was also carried out using prepared Bismuth based material by hydrolysis method. Tests indicated that bismuth-based nanocrystals fabricated at acidic pH and calcined at 700 degrees showcased a notable increase in CO<sub>2</sub> photoreduction capability, yielding CO at a rate of 673.3 μmol/g/cat and CH<sub>4</sub> at a rate of 70.2 μmol/g/cat.

**Keywords:** Bismuth based material, photocatalyst, ceramic fiber, Carbon block, clean environment, CO<sub>2</sub>, CO, CH<sub>4</sub>