

The Influence of Surfactants on the Morphology and Phase Purity of Nickel Molybdate for Enhanced Photocatalytic Activity: A kinetic study

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The development of effective photocatalyst for the decomposition of a broad spectrum of pollutants such as organic dyes in wastewater or natural water is of great importance in environmental realm. In this study, nickel molybdate ( $\text{NiMoO}_4$ ) with different crystalline-phase and morphologies such as sphere-like, rod-like and hierarchical were successfully synthesized via a surfactant-assisted hydrothermal reaction method. The photocatalytic degradation of the Reactive Yellow 160, as bio-resistant water pollutant, was conducted to investigate the photocatalytic properties of various morphologies of  $\text{NiMoO}_4$  samples. In summary, the  $\text{NiMoO}_4$  with alpha-phase crystal structure and rod-like morphology exhibited 2 times higher photocatalytic activity as compared to other synthesized morphologies and 1.5 times higher photocatalytic efficiency than that of commercial nano-ZnO. Furthermore, kinetic analysis confirmed that the degradation of above-mentioned dye follows the Langmuir-Hinshelwood kinetic model. Thus, this study unveils that  $\alpha$ - $\text{NiMoO}_4$  with rod-like morphology is a promising photocatalyst for environmental applications.