Construction of Novel Spinel based Photocatalyst for Highly Efficient CO_2 Conversion

Shiying Fan
State Key Laboratory of Fine Chemicals, Key Laboratory of Industrial Ecology and Environmental Engineering (MOE), School of Environmental Science and Technology, Dalian University of Technology, Dalian 116024, China

Constructing efficient photocatalysts for CO_2 conversion and synthesis of valuable chemical fuels has been one of the most promising strategies and challenge for both energy crisis and greenhouse gas control. Herein, a series of novel spinel based hierarchical nano-microspheres (MSHMs) with different internal and interface structures have been successfully developed. The morphology and structure, optical, as well as photoinduced redox reactions including interfacial charge carrier behaviors and the intrinsic relationship of structure–property between intrinsic nano-microstructures and physicochemical performance of those spinel based composites were systematically investigated with the assistance of various on- and/or off- line physical–chemical means and deeply elucidated in terms of the research outcomes. It is demonstrated that the modification of the interior microstructures and interface structures can be applied to tune the catalytic properties of spinel based catalysts by tailoring the temperature programming and heterojunction construction. The current research provides new insights into the molecular design of novel spinel structure catalysts and the intrinsic relationship of structure–property between interior structures (e.g., different crystal texture, morphologies structures, interface structures) and the physicochemical performance.