Visible light induced photocatalytic dye degradation using Ga(Ⅲ)-O-Mo(V) & Ga(Ⅲ)-O-W(VI) MMCT photocatalysts

Kadam Rahul, Naresh H. Tarte[1], 한상일†
창원대학교; [1]Korea Science Academy of KAIST
(shan@changwon.ac.kr†)

Developing charge transfer units that absorb visible-light and promote multielectron transfer reactions, such as water oxidation, hydrogen evolution, dye degradation and carbon dioxide reduction, is necessary for constructing efficient solar-to-chemical energy conversion systems. Heterobinuclear units linked by oxo bridges offer flexible control of the redox potential and absorption wavelength based on the selection of the grafted ions in the MMCT unit. In the present study, we firstly synthesized gallium oxynitride (GaON) from Gallium metal, ethylenediamine, and water and it is characterized by XRD and will further characterize by SEM and TEM. We selected GaON as a suitable precursor to synthesize MMCT catalyst because GaON was preferred over Ga¬2O3 due to its reduced band gap energy and higher photocatalytic activity. GaON has band gap energies from 2.2 to 2.8 eV due to which it shows significant activities in the visible light while Ga2O3 has band gap energy 4.9 eV. In this report the two oxo-bridged (heterobimetallic) Ga(III)-O-Mo(V) and Ga(III)-O-W(VI) metal-to-metal charge-transfer (MMCT) units synthesized from GaON, MoCl5 and GaON, WCl6 respectively.