

Design and Applications of Single-site Photocatalysts

Hiromi YAMASHITA*

Osaka University

(yamashita@mat.eng.osaka-u.ac.jp*)

Design of the isolated ion, cluster size and/or nano-particle size catalysts within the silica-based porous materials such as microporous zeolite and mesoporous silica is very attractive. The isolated and tetrahedrally coordinated metal oxide (Ti, V, Cr, Mo and W-oxides) moieties can be included in the matrixes of silica-based microporous and mesoporous materials and named as "single-site photocatalysts". Under UV-light irradiation these single-site photocatalysts form the charge transfer excited state, i.e., the excited electron-hole pair state which localize quite near to each other in different from the manner observed on semiconducting materials such as TiO_2 . These single-site photocatalysts not only can promote unique photocatalytic reactions but also can be utilized to synthesis of functional materials. The nano-sized metal catalysts and visible-light sensitive binary oxide photocatalysts can be synthesized on the excited single-site photocatalysts under UV-light irradiation. The transparent mesoporous silica thin film with single-site photocatalysts generates the super-hydrophilic surface. In this presentation, our recent applications of single-site photocatalysts are introduced.