Photocatalytic Activity of Silicon Nanocrystals: Effect of Transition between Direct and Indirect Band Gap

이강하, 이도창†
KAIST
(dclee@kaist.ac.kr†)

Silicon (Si) is regarded as a promising candidate photocatalyst material since Si is abundant, cheap, and nontoxic. Size-controlled Si nanocrystals especially can be an excellent candidate for photocatalyst due to their tunable band gap energy from near-infrared to visible light. In addition, Si nanocrystals show the transition of its band structure from indirect to direct band gap. However, there have been only a few attempts of studying photocatalytic activity of Si nanocrystals due to their instability in aqueous solution. Furthermore, there has been no study how transition of band structrue of Si nanocrystals affect to the real application such as photovoltaics and photocatalysis. In this study, we firstly examine the size-dependent photocatalystic activity of ligand-stabilized Si nanocrytstals ranging from 2.2 to 6.5 nm via photocatalystic water splitting reaction and investigate the effect of transition between direct and indirect band gap of Si nanocrystals to their photocatalystic activity.