

Study of Self-Assembled Photocatalyst by Metal-Terpyridine Interactions in Polymer Network

Authors : Dong-Cheol Jeong, Jookyung Lee, Yu Hyeon Ro, Changsik Song

Abstract : The design and synthesis of photo-active polymeric systems are important in regard to solar energy harvesting and utilization. In this study, we synthesized photo-active polymer, thin films, and polymer gel via iterative self-assembly using reversible metal-terpyridine (M-tpy) interactions. The photocurrent generated in the polymeric thin films with Zn(II) was much higher than those of other films. Apparent diffusion rate constant (k_{app}) was measured for the electron hopping process via potential-step chronoamperometry. As a result, the k_{app} for the polymeric thin films with Zn(II) was almost two times larger than those with other metal ions. We found that the anodic photocurrents increased with the inclusion of the multi-walled carbon nanotube (MWNT) layer. Inclusion of MWNTs can provide efficient electron transfer pathways. In addition, polymer gel based on interactions between terpyridine and metal ions was shown the photocatalytic activity. Interestingly, in the Mg-terpyridine gel, the reaction rate of benzylamine to imine photo-oxidative coupling was faster than Fe-terpyridine gel because the Mg-terpyridine gel has two steps electron transfer pathway but Fe-terpyridine gel has three steps electron transfer pathway.

Keywords : terpyridine, photocatalyst, self-assembly, metal-ligand

Conference Title : ICP 2016 : International Conference on Photochemistry

Conference Location : Paris, France

Conference Dates : September 26-27, 2016