

European Chemistry Congress

June 16-18, 2016 Rome, Italy

Polyaniline–ionic liquid mixtures and their application in dye-sensitized solar cells

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In this study, we investigated the interactions between the ionic liquids (ILs) of ammonium and imidazolium families and polyaniline–emeraldine base [PANI (EB)]. PANI (EB) is one of the most studied conducting polymers owing to its applications in electronics, optical devices, sensors, etc. However, there is a massive scope of improvement in this area. In order to increase the utility of PANI (EB), we studied the interactions between PANI (EB) and ILs by using various techniques. Further, we studied the conductivity, morphology, and roughness of PANI (EB)–IL mixtures. We observed that ammonium- and imidazolium-family ILs have the potential to interact with PANI (EB). However, after the interactions, the ammonium-family IL–PANI (EB) mixtures showed more conductivity than the imidazolium-family IL–PANI (EB) mixtures. We also determined the strength of hydrogen bonding between ILs and PANI (EB) from semiempirical calculations carried out using HyperChem 7. Finally, we demonstrated that PANI (EB)–IL additives can be used as electrolytes in dye-sensitized solar cells. This study provides an insight into the combined effect of a polymer [PANI (EB)] and ILs, and this insight may generate many theoretical and experimental opportunities.

Biography

Sang Jun Lee received his BS degree in Chemistry at Kwangwoon University in 2016. Currently, he is studying for his MS degree in chemistry at Kwangwoon University. His current research interests are mainly in the development of polymer chemistry under Professor In Tae Kim.

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