

티탄산화물 메조동공구조 막을 이용한 염료감응형 태양전지

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Application of Mesoporous Titania Films to Dye-Sensitized Solar Cell

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Key words : mesoporous TiO₂ (TiO₂ 메조동공구조), Dye sensitized solar cell (염료감응형 태양전지), mesopore (메조동공)

Abstract : Highly ordered mesoporous TiO₂ films were prepared by using triblock copolymer-templated sol-gel method via evaporation-induced self-assembly (EISA) process. First, the prepared mesoporous TiO₂ films were applied to the main electrode material in the dye-sensitized solar cells (DSCs). The DSC fabricated from these mesoporous films showed 1.7 times of photovoltaic current (J_{sc}) than those from the nanocrystalline films in the same thickness. It is deduced that the high J_{sc} is caused by the efficient transport of electrons due to few grain boundaries in the mesoporous TiO₂ structure, and by the fast diffusion of electrolytes with the high uniformity in the mesopore size. Second, the mesoporous TiO₂ films were used as an interfacial layer between the FTO and the main TiO₂ layer. The introduction of mesoporous TiO₂ films improved the photovoltaic conversion efficiency (η) by ~30 %. We also discussed the role of interfacial mesoporous TiO₂ layer in the enhancement of conversion efficiency.

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