ET-011

DSSC광전극의 나노구조 제어 및 투명전극 소재 개발

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Photoelectrochemical solar cells such as dye-sensitized cells (DSSCs), which exhibit high performance and are cost-effective, provide an alternative to conventional p-n junction photovoltaic devices. However, the efficiency of such cells plateaus at 11-12%, in contrast to their theoretical value of 33%. Improvements in efficiency can only occur through a fundamental understanding of the underlying physics, materials, and device designs of DSSCs.

A photoelectrode consisting of semiconducting oxide nanoparticles and a transparent conducting oxide electrode (TCO) is a key component of DSSC and design of photoelectrode materials is one of promising strategies to improving energy conversion efficiency. We introduce monodisperesed TiO_2 nanoparticles prepared by forced hydrolysis method and their superiority as photoelectrode materials was characterized with aids of optical and electrochemical analysis. Multi-layered TCO materials are also introduced and their feasibility for use as photoelectrodes is discussed in terms of optical absorption and charge collecting properties.