

## Hierarchical Core-Shell Nanostructures of SnO<sub>2</sub> Hollow Spheres Covered with TiO<sub>2</sub> Nanosheets for Dye-Sensitized Solar Cells

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_\*

(jonghak@yonsei.ac.kr\*)

Since O'Regan and Gratzel announced dye-sensitized solar cells (DSSCs), DSSCs gradually engage society's attention due to their ease of fabrication, low cost, green production process and high efficiency. Furthermore, substantial efforts have been made to fabricate solid-state DSSCs (ssDSSCs) with stable electrolytes. Obtaining fine pore-filling of solid electrolyte into a photoanode is pivotal for high energy conversion efficiency of ssDSSCs. A multi-layered shell is considered to be an effective way to satisfy these conditions as good photoanode. TiO<sub>2</sub> has been widely used as a photoanode in DSSCs over the last few decades. However, due to low electron mobility of TiO<sub>2</sub>, alternative metal oxides such as ZnO, Nb<sub>2</sub>O<sub>5</sub> and SnO<sub>2</sub> are considered as substitutes. Especially, SnO<sub>2</sub> has a decided advantage since its higher conduction band energy (3.6 eV) and electron mobility. In this study, we report 8.2 % conversion efficiency which is one of the highest values for ssDSSCs. This ssDSSC is based on inner SnO<sub>2</sub> hollow sphere (SHS) surrounded by outer TiO<sub>2</sub> nanosheets (TNS) which result in improved light scattering, large surface area and excellent electron transport.