Mesoporous TiO_2 with high surface area and controllable pore size for Dye-sensitized Solar Cells

윤민영, 김성수[1], 김명실, 김지만*
성균관대학교; [1]삼성전자 반도체
(jimankim@skku.edu*)

Dye-sensitized solar cells have attracted much attention with their low production costs of electricity and relatively high energy-conversion efficiencies. Among various kinds of semiconducting metal oxides, titanium dioxide (TiO_2) is the most widely used for materials in DSSC. Recently, nanocrystalline TiO_2 powders have been used as a working electrode for DSSC due to a higher efficiency, lower cost. In order to maximize the cell efficiency of DSSC, the TiO_2 material should have a high surface area where the dye can be sufficiently adsorbed.

Mesoporous materials have been attracted much attention due to their high surface areas as well as regular mesoporosities in the range of 2 – 10 nm. However, mesoporous TiO_2 by sol-gel method using surfactant have many drawbacks such as during the crystallization and the removal of the organic template by heat treatment, the mesostructure of TiO_2 is usually damaged. In this study, mesoporous TiO_2 materials was synthesized using mesoporous silica (pore size varying from 8nm to 22nm) as a template via nano-casting technique, and applied to DSSC electrode materials.