

GCOE Special Lecture



Speakers: *Dr. Yukihiro Hara*

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Title : *『Fabrication of ZnO Nanorods and Thin-Films Using Electrophoretic Deposition: Application for Dye Sensitized Solar Cells』*

Date : **Friday, October 21, 2011 10:00-11:00**

Place : **Shinshu University, Administration building , 2F
Large conference room**

Abstract: ZnO nanorods were obtained by solvothermal reaction using quantum dot precursors suspended in ethanol. The ZnO suspensions were prepared from ethanolic zinc acetate solutions in the presence of lithium hydroxide, and treated by solvothermal synthesis under different reaction temperatures and duration times. Parameters of processing of these nanorods were investigated, including the concentration of precursors and solvothermal temperature. The ZnO nanorod powders were characterized by XRD, SEM, TEM, FT-IR, thermal analysis, and isothermal N₂(g) adsorption analyses. Commercially available ZnO nanopowders were studied for comparison. Resulting ZnO nanorod powders were pure ZnO and showed higher surfaces area than commercial ZnO nanopowders. Length and diameter of ZnO nanorods depended on the concentration of precursors and the annealing temperature employed.

We have investigated a template-free electrophoretic deposition (EPD) process using preformed ZnO nanorods suspended in isopropanol. Thin-films comprised of ZnO nanorods were fabricated on transparent conductive oxide glass using EPD. Resulting ZnO thin-films were smooth and uniform, and film-weight was controlled by changing the voltage that was applied as well as the time of deposition. To illustrate one application of these electrophoretically deposited materials, the films of both ZnO nanorods and nanopowders were used as photoelectrodes of dye-sensitized solar cells (DSCs) and their performance tested. The DSCs fabricated with a film of ZnO nanorods showed higher efficiency than those of ZnO nanopowders.

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