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Preparation of ZnO Nanorods by Hydrothermal Method

The demands of a renewable energy source have been of wide interest. Hydrogen is attractive as a clean fuel source. A photoelectrochemical (PEC) cell is a promising hydrogen generation technology through the photoelectrolysis of water using solar energy. ZnO material is applied to PEC cells because ZnO has a favorable band edge position that straddles the redox potential of photoelectrolysis in water splitting. We will present the preparation of ZnO nanorods by hydrothermal method. The seed layer were prepared on a quartz substrate by dip-coating in the solution of zinc nitrate dehydrate, ethanol and diethanolamine. After the seeding process the samples were annealed at 100 or 150 °C for various times. The ZnO seed layer coated substrates were kept inside a teflon-lined autoclave which contained zinc nitrate hexahydrate, hexamethylenetetramine and DI water. Afterward, the autoclave was sealed and heated in a hot air oven at different temperature for 1 h. Then the obtained film was washed with DI water to remove the contamination for solution and then heated in hot air at 100 °C for 15 min. We obtained vertically grown ZnO nanorods at the annealing temperature of the seed layer of 150 °C for 2 h and growth temperature of 120 °C for 1 h. At the seed layer solvent concentration of 0.2 M, the morphology of ZnO nanorods was needle-like. At 0.9 M, hexagonal ZnO nanorods were obtained. We have successfully prepared hexagonal ZnO nanorods. The details of the characteristics will be presented.

Author: Ms WORASAWAT, Suchada (Research Institute of Electronics, Shizuoka University, 3-5-1 Johoku Naka-ku Hamamatsu 432-8011 Japan)

Presenter: Ms WORASAWAT, Suchada (Research Institute of Electronics, Shizuoka University, 3-5-1 Johoku Naka-ku Hamamatsu 432-8011 Japan)

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