Rapid synthesis and dye-sensitized solar cell applications of hexagonal-shaped ZnO nanorods

Ahmad Umara,c, A. Al-Hajryb, Y.B. Hahnc, D.H. Kimd*

a Department of Chemistry, Faculty of Science, Najran University, P. O. Box 1988, Najran 11001, Saudi Arabia
b Department of Physics, Faculty of Science, Najran University, P. O. Box 1988, Najran 11001, Saudi Arabia
c School of Semiconductor and Chemical Engineering and BK21 Centre for Future Energy, Materials and Devices, Chonbuk National University, Chonju 561-756, South Korea, d Division of Materials Science and Engineering, Hanyang University, Seoul 133-791, South Korea

Abstract:

This paper reports, for the first time, a very rapid and large-scale synthesis and dye-sensitized solar cells (DSSCs) application of well-crystallized hexagonal-shaped ZnO nanorods at very low temperature of about 70 ◦C in 20 min. The thin films of as-grown nanorods were used as photo-anode materials to fabricate the DSSCs which exhibited an overall light to electricity conversion efficiency (ECE) of 1.86% with a fill factor of 74.4%, short-circuit current of 3.41mA/cm2 and open-circuit voltage of 0.73V.

Electrochimica Acta 54, 5358-5362 (2009)