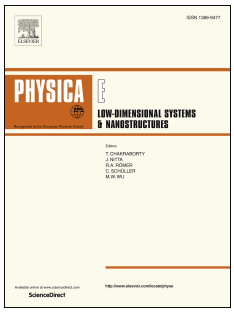
Accepted Manuscript



Controllable hydrothermal synthesis of bundled ZnO nanowires using cerium acetate hydrate precursors

Seok Cheol Choi, Sang Ho Sohn

PII: S1386-9477(18)30258-3

DOI: 10.1016/j.physe.2018.07.014

Reference: PHYSE 13217

To appear in: *Physica E: Low-dimensional Systems and Nanostructures*

Received Date: 17 February 2018

Revised Date: 20 June 2018

Accepted Date: 13 July 2018

Please cite this article as: S.C. Choi, S.H. Sohn, Controllable hydrothermal synthesis of bundled ZnO nanowires using cerium acetate hydrate precursors, *Physica E: Low-dimensional Systems and Nanostructures* (2018), doi: 10.1016/j.physe.2018.07.014.

Controllable hydrothermal synthesis of bundled ZnO nanowires using cerium acetate hydrate precursors

Seok Cheol Choi[1] and Sang Ho Sohn[2]*

[1]Department of Process Development, LG electronics, Gumi 730-030, Korea

[2]Department of Physics, Kyungpook National University, Daegu 702-701, Korea

Abstract

ZnO nanowire arrays were grown by the hydrothermal decomposition of zinc acetate dehydrate in precursor solutions containing cerium acetate hydrate. The effects of the Ce precursor on the hydrothermal synthesis of ZnO nanowires were investigated as a function of the Ce concentration. It was found that all the samples exhibited preferential orientation toward the c-plane and the Ce precursor had no effect on the lattice constant in the ZnO nanowires. ZnO nanowires grown in solutions containing 1 and 2 at% Ce precursors were bent and bundled, suggesting that solutions containing adequate amounts of Ce precursors enable the top surfaces of the vertically aligned ZnO nanowires to be either positively or negatively charged, and that electrostatic interactions among these local charges causes bending and bundling of the ZnO nanowires. Thus, Ce precursors in the solutions can control the morphology of the ZnO nanowires, causing them to be bent and bundled. We suggest that the bundled ZnO is applicable to Dye-sensitized solar cells because it can be enhanced adsorbed dye amounts in devices.

Keywords: ZnO nanowires, bent and bundled, cerium acetate hydrates, hydrothermal, DSSC

* Corresponding author E-mail address: shsohn@knu.ac.kr (S. H. Sohn)