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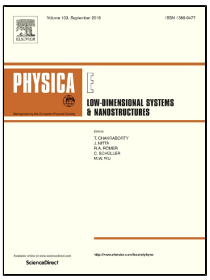

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Defects controllable ZnO nanowire arrays by a hydrothermal growth method for dye-sensitized solar cells

Haowen Guo[a], Ran Ding[a], Ning Li[a], Kunquan Hong[a,*], Liqing Liu[b,*] Hongguang Zhang[b]

[a] School of Physics, Southeast University, Nanjing, 210096, China

[b] Information Physics Research Center, Nanjing University of Posts and Telecommunications, Nanjing, 210023, P. R. China

Abstract

We report the growth control of ZnO nanowire arrays to fasten the growth rate and reduce the defects by a microwave-assisted hydrothermal method for dye-sensitized solar cells (DSSCs). After optimization of the growth parameters during the hydrothermal synthesis, fast length growth rate and a flat upper surface with low defects are obtained. It is found that rather low concentration of the raw materials of hexamethylenetetramine (HMTA) is necessary to avoid the brush defects on the nanowires arrays, which is also helpful to reach the maximum length growth rate up to 6.0 micron per hour. When used as the photoanode in DSSCs, these nanowires show high power conversion efficiency which is attributed to the enlarged internal surface area to increase dye adsorption on the photoanode to improve the light harvest. So this work shows an efficient method to obtain ZnO nanowires with low defects for DSSCs.

Keywords: ZnO nanowire arrays; low defects; hydrothermal method; dye-sensitized solar cells

Corresponding author:

Dr. Liqing Liu

Information Physics Research Center, Nanjing University of Posts and Telecommunications, Nanjing, 210023, P. R. China

Tel: +86-25-85866175 Fax: +86-25-85866600

E-mail address: hongkq@gmail.com (K.Q. Hong), liulq@njupt.edu.cn (L. Q. Liu)