Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Preparation of perpendicular oriented TiO2 films via hydrothermal method: phase selection and growth control[1] YUN GAO, MEILAN GUO, XIAOHONG XIA, University of Hubei, GUOSHENG SHAO, University of Bolton — Either rutile or anatase vertical orientated TiO_2 array films were synthesized successfully on FTO (F: SnO_2) substrate via hydrothermal method through controlling the concentration of Cl^- and SO_4^{2-}. The density of nanorods can be adjusted by varying the volume ratio of ethanol/water, and the degree of orientation and crystallinity of TiO_2 nanofilms were enhanced with increasing dosage of ethanol. Meanwhile, completely dense anatase films with [004] oriented growth appear within a very narrow concentration window when adding sulfuric acid into precursor. Besides, other alcohols such as methanol, n-propanol and n-butyl were also used as solvent to examine the role of alcohol type during hydrothermal process for both two phase films. The growth rate and degree of perpendicular orientation declined as the alkyl length of solvents increases. Hydrogen sensing characteristics of dense films of both rutile and anatase phases showed that there was a remarkable improvement of sensitivity response over reported data. It was found that rutile films have higher sensitivity while anatase films have faster response.

[1]This work is supported by Ministry of Education of China (211108) and Science and Technology of Wuhan (2010CDA024, 201110821251).

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Date submitted: 12 Nov 2012 Electronic form version 1.4