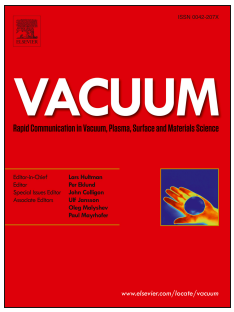
# Accepted Manuscript

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PII: S0042-207X(16)30147-6

DOI: 10.1016/j.vacuum.2016.05.017

Reference: VAC 7026

To appear in: *Vacuum*

Received Date: 3 March 2016

Revised Date: 12 May 2016

Accepted Date: 18 May 2016

Please cite this article as: Faiz M, Qurashi A, Tabet N, Rapid Microwave Assisted Synthesis of $Zn_{1-x}In_xO$ heterostructured nanotetrapods and their Hydrogen Sensing Properties, *Vaccum* (2016), doi: 10.1016/j.vacuum.2016.05.017.

# Rapid Microwave Assisted Synthesis of $Zn_{1-x}In_xO$ Heterostructured Nanotetrapods and their Hydrogen Sensing Properties

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**Abstract**

$Zn_{1-x}In_xO$ nanostructures have been synthesized in large quantity by a microwave-assisted evaporation method. A mixture of high purity zinc and indium metal flakes evaporated under ambient air using a microwave absorber placed in a conventional microwave oven. This is single step, fast and very effective method to produce large quantity (grams) of $Zn_{1-x}In_xO$ nanotetrapods. The synthesized nanotetrapods powder was characterized by X-ray Photoelectron Spectroscopy (XPS), X-ray Diffraction (XRD), Field Emission Scanning Electron Microscopy (FESEM), and Transmission Electron Microscopy (TEM). The observations and analyses confirmed the formation of high aspect-ratio nanotetrapods and the incorporation of In into the ZnO creating heterostructure. Hydrogen gas sensor made from the nanotetrapods $Zn_{1-x}In_xO$ showed reversible response and recovery. The results are consistent with a sensing mechanism controlled by the presence of a space charge region at the surface of the sensor.

Key words: $Zn_{1-x}In_xO$; XPS analysis, microwave synthesis; nanotetrapods; $H_2$ gas sensor;

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## 1. Introduction