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## Rapid Microwave Assisted Synthesis of $\text{Zn}_{1-x}\text{In}_x\text{O}$ Heterostructured Nanotetrapods and their Hydrogen Sensing Properties

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### Abstract

$\text{Zn}_{1-x}\text{In}_x\text{O}$  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  $\text{Zn}_{1-x}\text{In}_x\text{O}$  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  $\text{Zn}_{1-x}\text{In}_x\text{O}$  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:  $\text{Zn}_{1-x}\text{In}_x\text{O}$ ; XPS analysis, microwave synthesis; nanotetrapods;  $\text{H}_2$  gas sensor;

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### 1. Introduction

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