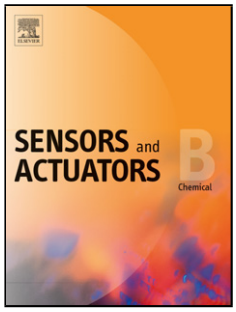

Title: In-situ integration and surface modification of functional nanomaterials by localized hydrothermal reaction for integrated and high performance chemical sensors

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Title
In-situ integration and surface modification of functional nanomaterials by localized hydrothermal reaction for integrated and high performance chemical sensors

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Abstract
We have developed a novel method for simple, rapid and selective synthesis of one dimensional nanomaterials as well as their selective surface functionalization, all in low-temperature and liquid-phase conditions, for highly integrated chemical sensor applications. In specific, localized heating by microheater allows selective synthesis and in-situ integration of ZnO nanowires on sensing electrodes. High surface area and chemical reactivity of nanowires enable high sensitivity and fast response to hydrogen (H_2) molecules. Furthermore, subsequent localized heating process in metal precursor solution allows facile surface functionalization of ZnO nanowires with catalytic metal nanoparticles (Pt or Pd), which dramatically enhanced the gas sensing performances. This approach has demonstrated a practical method of developing integrated chemical sensors with heterogeneous nanostructures, potentially for multiplexed chemical detection purposes.

Highlights
- ZnO nanowires were synthesized by local hydrothermal synthesis method.
- Metal nanoparticles were coated on the ZnO nanowires by local wet chemical reaction.
- We developed simple and cost effective nanodevice fabrication methods.
- Metal coated ZnO nanowires shows superior hydrogen gas sensing performance.

Keywords
nanowire, localized synthesis, metal nanoparticle, surface functionalization, gas sensor, chemical sensor

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