Aline Simo, J Nanomed Nanotechnol 2016, 7:3(Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.034

Gas Sensing Properties of VO_2 –Vanadium Dioxide Nanobelts: Strongly Correlated Materials in Low Dimension

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Porous polycrystalline resistors made of metal oxides are highly demanded as semiconductor gas sensors. The operating at low temperature requires narrow band gap resistive gas sensors amongst which vanadium oxides have been found to be suitable for gas sensing materials. This is due to their ability to be used as catalysts in oxidation reaction and to form different lower oxides stoichiometry of the VO cubic lattice derived from V_2O_5. Hydrogen (H_2) is one of the attractive energy sources to succeed the current carbon based energy, with the highest specific energy content of 141.79 MJ/kg and high risk of explosions while handling its storage and usage. In relation to H_2 economy, various 1-D nanomaterials have been investigated as ideal candidates for gas sensing applications. Well established gas sensing materials such as SnO_2, ZnO, WO_3, have shown higher sensitivity and selectivity efficiency at high temperature resulting in significant power consumption with addition to their complexities in device integration. VO_2 oxide nanobelts are demonstrated to be effective hydrogen gas sensors at room temperature with sensitivity as low as 14 ppm. The nanobelts (ultralong belt-like) nanostructures could be an ideal system for fully understanding dimensionally confined transport phenomena in functional oxides and for building functional devices based on individual nanobelts.

Biography

Aline Simo has completed her PhD at the age of 29 years from Western Cape University and was awarded the l`Oreal Unesco For Women in Science. She is currently doing her postdoctoral studies at UNISA University, College of Graduate Studies. She is working on various V-based systems functional materials and she has bringing new insight regarding the potential sensing application aspect of the vanadium oxide material at room temperature.

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