Sensors & Transducers Journal, vol. 189(6): 143-149

# One-Dimensional Vanadium Dioxide nanostructures for room temperature hydrogen sensors

http://www.sensorsportal.com/HTML/DIGEST/P_2682.htm

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ABSTRACT:

In relation to hydrogen ($H_2$) economy in general and gas sensing in particular, an extensive set of one dimensional (1-D) nano-scaled oxide materials are being investigated as ideal candidates for potential gas sensing applications. This is correlated to their set of singular surface characteristics, shape anisotropy and readiness for integrated devices. Nanostructures of well-established gas sensing materials such as Tin Oxide (SnO2), Zinc Oxide (ZnO), Indium (III) Oxide ($In_2O_3$), and Tungsten Trioxide ($WO_3$) have shown higher sensitivity and gas selectivity, quicker response, faster time recovery, as well as an enhanced capability to detect gases at low concentrations. While the overall sensing characteristics of these so called 1-D nanomaterials are superior, they are efficient at high temperature; generally above 200 degrees C. This operational impediment results in device complexities in integration that limit their technological applications, specifically in their miniaturized arrangements. Unfortunately, for room temperature applications, there is a necessity to dope the above mentioned nano-scaled oxides with noble metals such as Platinum (Pt), Palladium (Pd), Gold (Au), Ruthenium (Ru). This comes at a cost. This communication reports, for the first time, on the room temperature enhanced $H_2$ sensing properties of a specific phase of pure Vanadium

Dioxide ($VO_2$) phase A in their nanobelt form. The relatively observed large $H_2$ room temperature sensing in this Mott type specific oxide seems to reach values as low as 14 ppm $H_2$ which makes it an ideal gas sensing in $H_2$ fuelled systems.