VO_2 Nanostructures High Surface Ratio: Application as Gas Sensing Device

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Abstract Porous polycrystalline resistors made of semiconducting oxides are highly demanded as semiconductor gas sensors containing receptor function, transducer function and factor body. The operating at low temperature requires narrow band gap resistive gas sensors amongst which ensemble of vanadium oxides nanopowders have been found to be suitable for gas sensing materials 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. VO_2 has been used as nanowires gas sensing thermistor, associated to catalytic metal gate of Pd and recently shows good stability, fast response and good recovery detection in low relative humidity (11.5% RH) and high relative humidity (97.2% RH) respectively. However no report has been done on the room temperature sensitivity to H_2 gas of as synthesized VO_2 nanostructures without catalytic additive sensing even 14ppm of the analytic gas reproducible also at 50 deg. C Were we present a good nanorod VO_2 material sensing the H_2 due to its open junction grain and low energy surface (high surface ratio). [1-2]

References

[1] K. Okimura and N. Kubo, Japanesse J. Appl. Phys., **44** (2005) 1150.

[2] V. Eyert, Europhys. Lett., **58** (2002) 851.

Figures

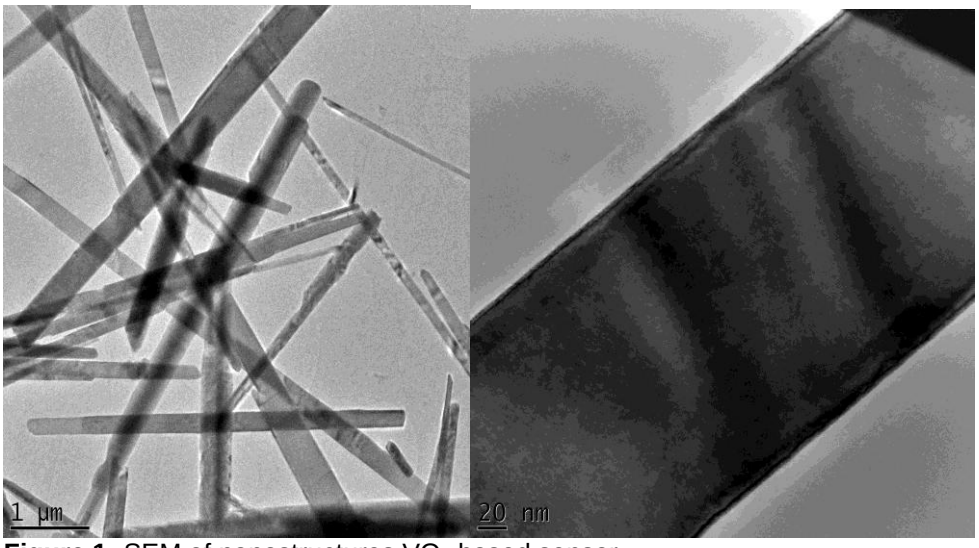

Figure 1: SEM of nanostructures VO_2 based sensor

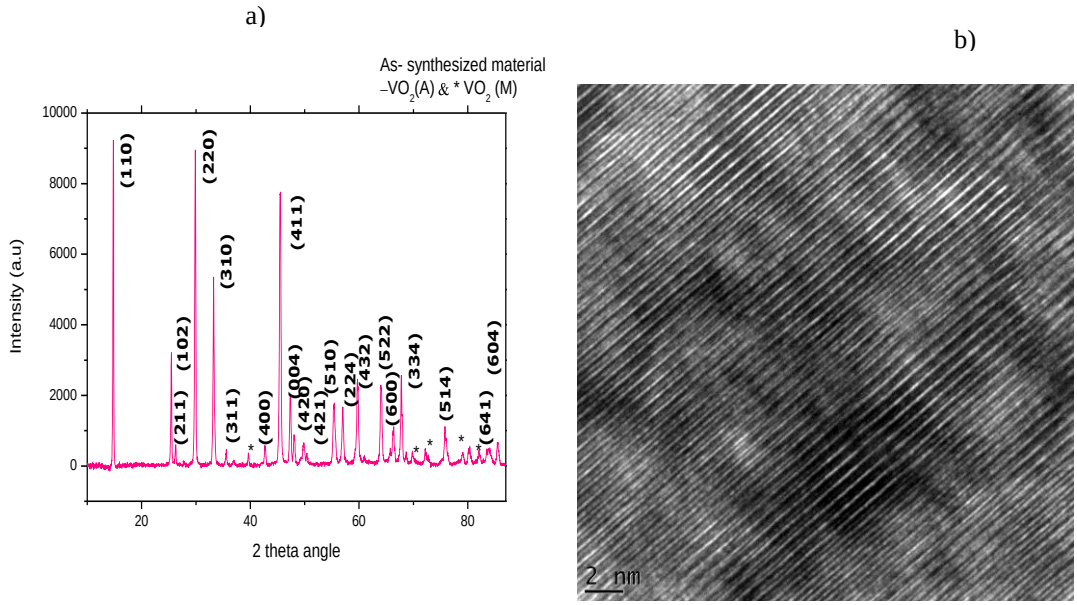

Figure 2: XRD crystallography of VO_2 a) and open junction grain of nanostructures VO_2 b)

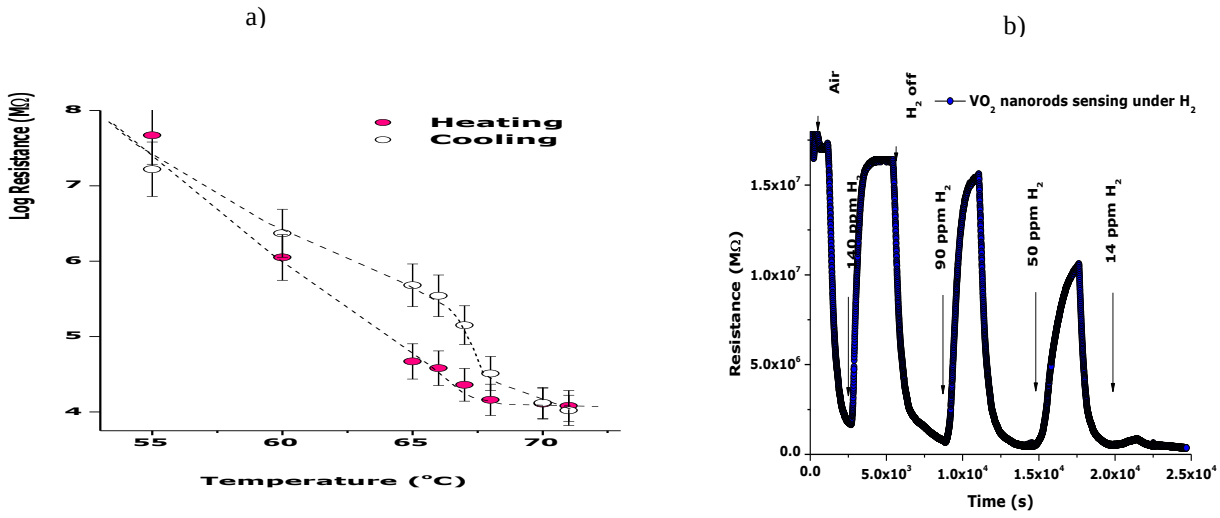

Figure 2: Typical electrical resistance and cycling evolution of cold pressed powder of nanobelts of VO_2 (A) versus temperature a) Room temperature variation of the conductometric sensing signal for the considered H_2 relative concentrations i.e. 140, 90, 50, 14 and 0.17 ppm. b)