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Title: Novel single phase vanadium dioxide nanostructured films for methane sensing at near room temperature

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Novel single phase vanadium dioxide nanostructured films for methane sensing at near room temperature

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Abstract: Methane (CH₄) gas sensing properties of novel vanadium dioxide (VO₂) nanostructured films is reported for the first time. The single phase nanostructures are synthesized by pulsed dc-magnetron sputtering of V target followed by oxidation in O₂ atmosphere at 550°C. The partial pressure of O₂ is controlled to obtain stoichiometric VO₂ with the samples showing rutile monoclinic crystalline symmetry and regions of rod shaped nano-architectures. These nanostructured films exhibit a reversible semiconductor to metal transition in the temperature range of 60-70°C. Gas sensing experiments are carried out in the temperature span from 25°C to 200°C in presence of CH₄. These experiments reveal that the films respond very well at temperatures as low as 50°C, in the semiconducting state.

Keywords: vanadium dioxide; nanorods; semiconductor – metal transition; methane sensing

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