Contribution ID: **126**   Type: **Poster Presentation**

V2O5 nanostructures for gas sensing: doping, and low temperature detection of Methanol, Ethanol and NO2 with superior response of H2S

Tuesday, 4 July 2023 16:03 (1 minute)

A facile reflux method was used to synthesize the undoped and Au-doped V_2O_5 nanoparticle powder samples at concentrations ranging from 1 wt% to 5 wt%. XRD, SEM, BET, FTIR and UV-Vis analysis revealed a change in morphology from spherical to nanorod-like nanostructures upon doping with the gold. The Au-doped V_2O_5 nanostructures tend to increase in surface area, and also become more crystalline with increase in Au concentration. The V_2O_5 nanostructures were found to have a larger optical band gap when compared with bulk V_2O_5. The undoped V_2O_5 sample was tested against ethanol (C_2H_5OH), hydrogen sulphide (H_2S), methanol (CH_3OH) and nitrogen dioxide (NO_2), at low temperatures ranging from 25oC to 150oC and concentrations from 5 ppm to 100 ppm. A high response of 130 towards 100 ppm H_2S at 75oC, was exhibited by the undoped sensor. The sensitivity of the V_2O_5 sensor in the low temperature range of 25oC to 150oC was found to follow the sequence of H_2S > C_2H_5OH > CH_3OH > NO_2.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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Session Classification: Poster Session 1

Track Classification: Track A - Physics of Condensed Matter and Materials