Contribution ID: **231** Type: **Oral Presentation**

The effects of chromium metal ion on belt-like In2O3 products and their ethanol gas sensing properties

Wednesday, 5 July 2023 10:20 (20 minutes)

This study focuses on surface defect rich 1D fiber-like Cr-doped In2O3 products produced via electrospinning. The effects of Cr dopant ions on the ethanol gas sensing behaviour of the 1D fiber-like Cr-doped In2O3 products were examined. Explicit analysis pertaining to the structure, morphology, and surface related defects of the 1D fiber-like Cr-doped In2O3 products was conducted to obtain information on the gas sensing results. The Cr-doped In2O3 sensor with 1 mol% doping level presented improved gas sensing characteristics, exhibiting a reduced working temperature from 100 to 80 ℃, a high responsive value of 12, and rapid response/recovery times of 41/43s towards 50 ppm ethanol gas. A low detection limit of 2.18 ppm, as well as high selectivity and excellent stability towards 50 ppm of ethanol gas, was also demonstrated by this sensor. XPS analysis indicated that the improved gas sensing results stem from the maximum number of oxygen vacancies and chemisorbed oxygen species induced by the introduction of Cr dopant ion inside the In2O3 lattice. The high number of oxygen vacancies facilitated the adsorption of the ethanol gas molecules on the sensor material, while the large number of chemisorbed oxygen species permitted a high number of oxygen molecules to be chemically adsorbed on the sensor material.

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

Yes

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

PhD

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Session Classification: Physics of Condensed Matter and Materials Track 1

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