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High selective and sensitive acetone gas sensor: Effects of Cerium metal ion on pyramid-like In₂O₃ products

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Herein, a high-performance acetone gas sensor based on pyramid-like Ce-doped In₂O₃ products was generated using a facile electrospinning approach followed by annealing at 550 °C. Systematic characterization techniques demonstrated that the introduction of Ce dopant ions into the In₂O₃ lattice can improve the acetone gas sensing properties by inducing a high concentration of oxygen vacancies at different Ce dopant levels through the Ce³⁺/Ce⁴⁺ redox couple. A contrast of the acetone gas sensing performance of the pure and Ce-doped In₂O₃ sensors at doping levels of 0.5, 1.5 and 2 mol% showed that all Ce-doped In₂O₃ sensors exhibited high selectivity and high response towards 90 ppm of acetone at 150 °C with a 1.5 mol% Ce-doped In₂O₃ sensor presenting a maximum response value of 12, which is three-fold greater than that of the pure In₂O₃ sensor and a low detection limit of 1.98 ppm. With such enhanced acetone gas sensing capabilities, the Ce-doped In₂O₃ sensor with a doping level of 1.5 mol% can be utilised as an auspicious gas sensing layer for detecting acetone gas in real environments.

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

Yes

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

PhD

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