

NiO Decorated CeO₂ Nanostructures for Room Temperature Isopropanol Gas Sensor

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Fabrication of gas sensors and their gas sensing measurements

The detailed procedure to fabricate the gas sensors and their gas sensing tests are described elsewhere.¹ In brief, thick slurries of both pure CeO₂ NP and NiO/CeO₂ NC powders were prepared separately and coated on alumina plates which are having pre-coated silver electrodes. These coated thick films were dried at a temperature of 80°C for 3 h on hot plate (Fig. S1). Custom made gas sensing unit consisting an air sealed glass chamber equipped with a heater, probes, and a thermocouple was utilized to investigate the gas sensing response of the prepared gas sensors (Fig. S2). Required concentration of the test gas was measured from static liquid distribution method, which was calculated by following equation.

$$C = \frac{22.4 \times \phi \times \rho \times V_1}{M \times V_2} \times 1000 \text{ ppm} \quad (1)$$

where C (ppm) is the required test gas concentration in ppm, ϕ denotes the target gas volume fraction, ρ (g ml⁻¹) indicates the density of the liquid, V₁ (μl) and V₂ (l) are the volumes of liquid and chamber respectively, and M (g ml⁻¹) is the molecular weight of the liquid. The gas sensing response of the sensor was calculated using the following equation

$$S = R_a/R_g \quad (2)$$

where R_a and R_g are the resistances of the sensor in the presence of air and targeted gas respectively. The gas sensing response measuring circuit is schematically presented in Fig.1. The input voltage of 5 V was supplied to the circuit and output voltage was observed across virtual resistor which varies according to the sensor resistance. The target gas was evaporated by injecting the required amount of liquid onto the hot bottom plate of the chamber. All the gas sensing measurements of the fabricated gas sensors were performed under normal laboratory conditions (~35% RH, 28°C).

Figure Captions:

Figure S1: Schematic diagram showing the thick film sensor coating.

Figure S2: Gas sensing setup used in the study.

Figures:

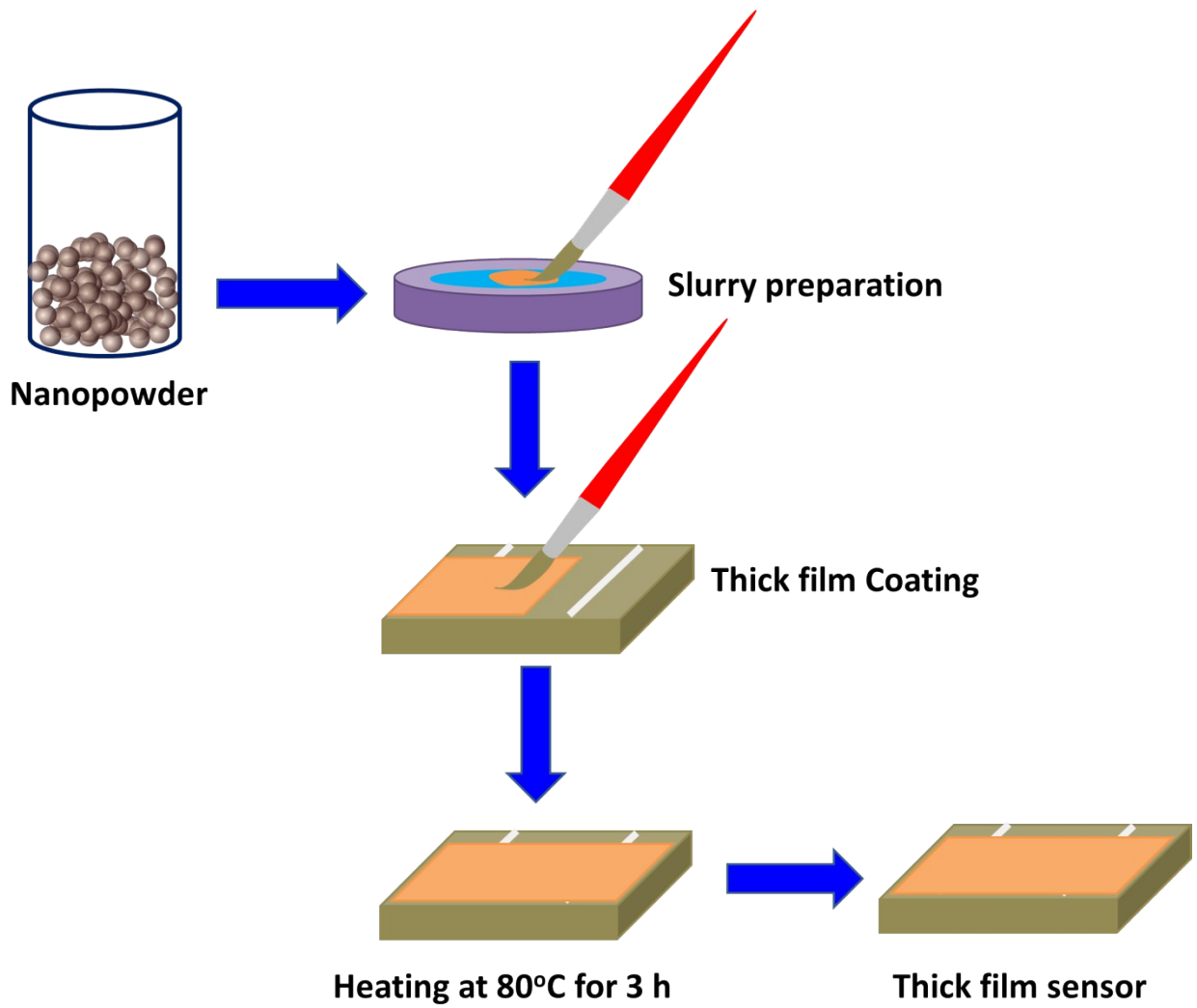


Figure S1

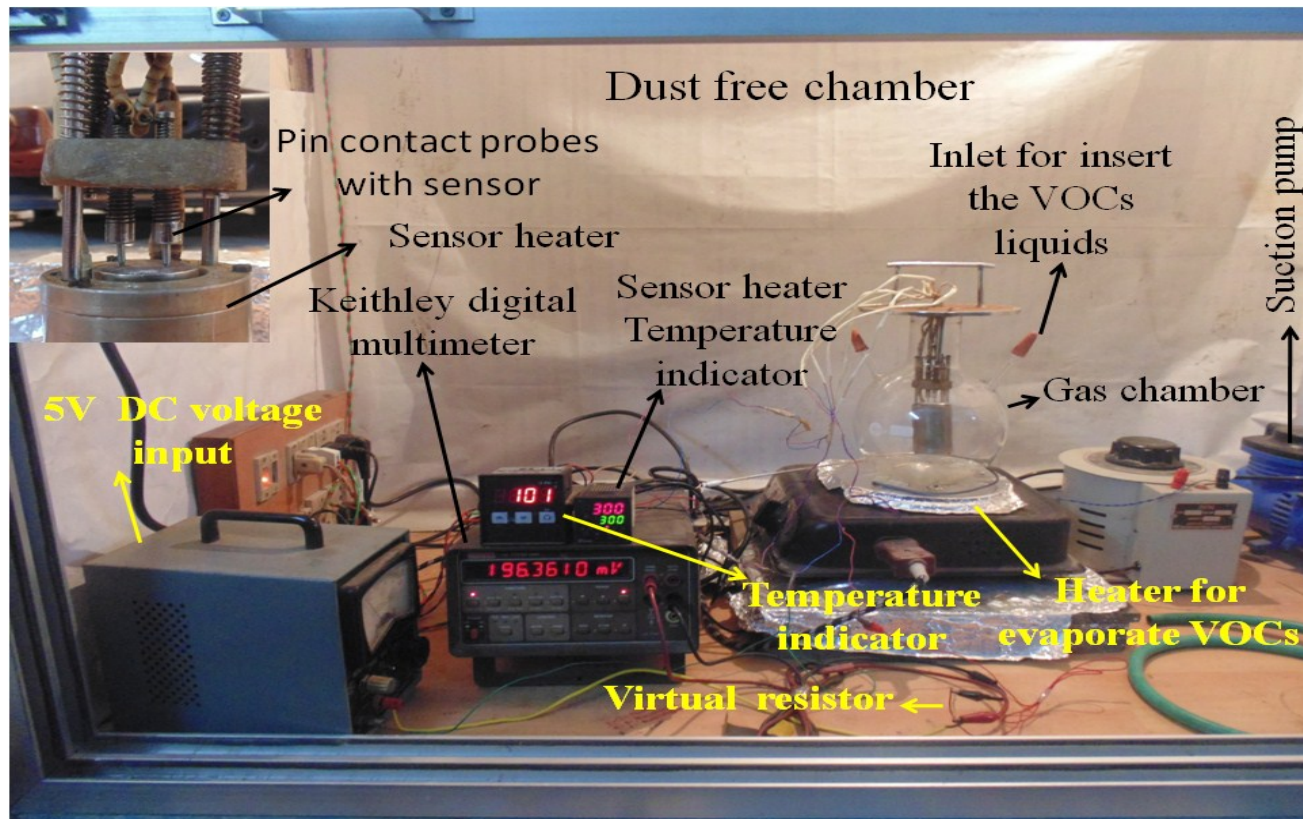


Figure S2

References:

1. M. Poloju, N. Jayababu, E. Manikandan and M. V. Ramana Reddy, *Journal of Materials Chemistry C*, 2017, **5**, 2662–2668.