NH_4OH 수용액 하에서 Cu 호일의 산화를 통해 합성한 CuO 나노벽의 가스센싱 특성

Gas sensing properties of CuO nanowalls synthesized via oxidation of Cu foil in aqueous NH_4OH

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Abstract. Copper is one of the most abundant metals on earth. Its oxide (CuO) is an intrinsically p-type metal-oxide semiconductor with a bandgap (E_g) of 1.2–2.0 eV 1. Copper oxide nanomaterials are considered as promising materials for a wide range of applications e.g., lithium ion batteries, dye-sensitized solar cells, photocatalytic hydrogen production, photodetectors, and biogas sensors 2–7. Recently, high-density and uniform CuO nanostructures have been grown on Cu foils in alkaline solutions 3. In 2011, T. Soejima et al. proposed a facile process for the oxidation synthesis of CuO nanobelt arrays using NH_3-H_2O_2 aqueous solution 8. In 2017, G. Kaur et al. synthesized CuO nanostructures by treating Cu foils in NH_4OH at room temperature for different treatment times 9. The surface treatment of Cu in alkaline aqueous solutions is a potential method for the mass fabrication of CuO nanostructures with high uniformity and density. It is interesting to compare the gas sensing properties among CuO nanomaterials synthesized by this approach and by others. Nevertheless, none of above studies investigated the gas sensing properties of as-synthesized CuO nanomaterials. In this study, CuO nanowalls versus nanoparticles were synthesized via the oxidation process of Cu foil in NH4OH solution at 50–70 °C. The gas sensing properties of the as-prepared CuO nanoplates were examined with C_2H_5OH, CH_3COCH_3, and NH_3 at 200–360 °C.