

Sensing Enhancement of Gold Nanoparticles Doped-TiO₂ Thin Films as H₂S Gas Sensor

Titanium dioxide and gold nanoparticles were synthesized using an environmentally friendly method to deposit undoped and Au-doped TiO₂ thin films on silicon and glass substrates via the spray pyrolysis technique. The effect of the Au nanoparticles concentrations on structural, morphological, and hydrogen sulfide (H₂S) gas sensing characteristics of TiO₂ thin films were investigated. An X-ray diffraction pattern confirmed the polycrystalline structure of the films deposited on glass and Si substrates with a dominant rutile phase and the formation of additional mixed-phases of Ti-Au bonding. According to a Field Emission-Scanning Electron Microscopy investigation, the cluster size ranged from 20 to 180 nm depending on the concentration of AuNPs. The sensing response of the prepared films was tested against H₂S at different operating temperatures. The effect of growing a mixture of titanium-gold phases as a ...