

Advanced Humidity Sensors Using Cobalt and Iron-Doped ZnO-rGO Composites

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Abstract : Humidity sensors based on doped ZnO-rGO composites have shown promise due to their sensitivity to humidity changes. Here, it report on the hydrothermal synthesis of ZnO-rGO and doped ZnO-rGO nanocomposites, incorporating cobalt and iron dopants at 2% concentration. X-ray diffraction confirmed successful doping, while scanning electron microscopy revealed the composite's layered structure with embedded ZnO rods. To evaluate their performance, humidity sensors were fabricated by depositing aluminum electrodes on silicon substrates coated with the composites. The Fe-doped ZnO-rGO sensor exhibited rapid response (27 s) and recovery times (24 s) across a wide humidity range (11% to 97% RH), surpassing ZnO-rGO and Co-doped ZnO-rGO variants in sensitivity (2.2k at 100 Hz). These findings highlight Fe-doped ZnO-rGO composites as ideal candidates for humidity sensing applications, offering enhanced performance crucial for environmental monitoring and industrial processes.

Keywords : humidity sensors, nanocomposites, hydrothermal synthesis, sensitivity

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