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Nanostructured ferrites as room temperature humidity sensor

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Present paper deals synthesis and characterization of nanostructure Ferrite materials like Fe_2O_3, $NiFe_2O_4$ $CuFe_2O_4$ and $ZnFe_2O_4$. The sensing materials were characterized by SEM, XRD and UV-Visible spectroscopy. The powders synthesized materials were compacted in to pellets using hydraulic press. Thick and thin films of samples were prepared by screen printing and sol-gel spin coating techniques on saperate alumina substrates respectively. After it their humidity sensing properties were investigated. The variations of resistance with %RH of the sensing elements were measured. Out of all investigated material, the thin film of $ZnFe_2O_4$ gave maximum average sensitivity 47.5 MΩ/%RH with ±2% hysteresis. Best sensitivity, less hysteresis and good reproducibility identifies that fabricated humidity sensor ($ZnFe2O_4$) is promising and challenging.

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Efficiency, power, and period at two optimum operations of a thermoelectric single-level quantum dot

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We take a single-level quantum dot embedded between two metallic leads at different temperatures and chemical potentials which work as a heat engine. Two optimization criteria were used and their corresponding optimized efficiencies, powers, and periods evaluated. A comparison between similar quantities of the two optimization criteria reveals mixed advantages and disadvantages. We quantify the engine's overall performance by suggesting a figure of merit that takes into account the contribution of each of the three quantities. Based on the proposed figure of merit, one of the optimization criterions presents a clear advantage. This same criterion is found to be invariably advantageous when applied to three other representative models.

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Tribology of Al base nanocomposite reinforced with CMA nanoparticles after extrusion

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The present work focuses on studies of manufacturing and investigation of hardness and tribological behavior of aluminum alloy matrix composites (AAMCs) reinforced with various volume fractions of particles made of complex metallic alloys (CMAs). Microstructure refining after extrusion helped reduction of friction coefficient and wear rate in higher normal loads at room and elevated temperature. Scanning electron microscopic observation of the worn surfaces was conducted and the dominant wear mechanism was recognized to be abrasive wear accompanied by some delamination wear. X-ray diffraction and transmission electron microscopy (TEM) tests were carried out to investigate the formation of single phase nanoparticle of after several hours of milling.

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