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Structural, morphological, optical and magnetic properties of Cu1-xNixFe2O4 nanoferrites

Talaat M. Hammad [1], Ayman Abu Amsha[1], Kuhn[2], R Hempelmann[2], Nasser K Hejazy[3]

[1] Al-Azhar University, Palestine

[2] Saarland University,Germany

[4] Al-Quds Open University,Palestine

Biography

Dr Talaat Hammad was born in gaza, Palestine, in 1957. He received the B.Sc. degree in physics from the university of mansoura, Egypt, 10 1980, and M.Sc. degree in solid state physics from the university of cairo, Egypt in 1983. He got his Ph.D. degree in material science from moscow state university, moscow, Russia.

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Cu1-xNixFe2O4 ($0 \le x \le 1$) nanoferrites was prepared via a co-precipitation technique. The influence of Ni2+ substitutions on the structure, morphological, optical, magnetic properties of Cu1-xNixFe2O4 nanoferrites was studied. XRD patterns of synthesized samples show the single-phase formation of spinel crystalline structure without any trace of impurity. The substitution of Ni2+ in Cu1-xNixFe2O4 results in a reduce of particle size from 20 to 11 nm. Additionally, the lattice constant decreased from 8.362 to 8.345 8 Å with increasing the concentration of Ni2 ions. The particle sizes got from TEM micrographs are in agreement with crystallite size calculated from XRD results. The FTIR spectra of Cu1-xNixFe2O4 displays two principal broad metal-oxygen bands. The band gap energy of nanoferrites will increase from 3.32 to 3.62 eV with an increase the content of Ni2+ ions. The magnetic properties of the samples were measured using a superconductive quantum interferometer (SQUID) system at room temperature. The findings exhibit that the magnetic properties of copper ferrite are greatly impacted by the amount of Ni2 ions doping. When the amount of nickel ions increases, the saturation magnetization increases as seen from the M-H loops.

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