# A simple thermal treatment synthesis and characterization of Ni-Zn ferrite ($Ni_{0.5}Zn_{0.5}Fe_2O_4$) nanocrystals


## ABSTRACT

Cubic structured nickel-zinc ferrite nanoparticles ($Ni_{0.5}Zn_{0.5}Fe_2O_4$) have been synthesized by thermal treatment method. This simple procedure employed an aqueous solution containing only metal nitrates as precursors, polyvinyl pyrrolidone as a capping agent, and deionized water as a solvent. The solution was thoroughly stirred for 2 hour, dried at 353 K for 3 hour, the dried material crushed into powder and calcined the powder at 873 K to remove organic substances and crystallize the particles. The microstructure properties of the prepared ferrite nanoparticles were measured using FTIR, XRD, TEM, and EDX and the magnetic properties were determined using VSM and EPR. The average particle size increased from 7 to 22 nm with the increase of calcination temperature from 723 to 873 K. The saturation magnetization, coercivity field, and g-factor increased respectively from 24 emu/g, 11 G, and 2.0673at 723 K to 38 emu/g, 60 G, and 2.1227 at 873 K. This method offers simplicity, a low cost, and an environmentally friendly operation since it produces no by-product effluents.



**Keyword:** Thermal treatment; Nickel-zinc ferrite; Nanoparticles; structural and magnetic properties.