# Influence of concentration of magnetic nanoparticles on the blocking temperature in $0.05Fe_2O_3/0.95ZnO$ and $0.10Fe_2O_3/0.90ZnO$


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Samples of $0.05Fe_2O_3/0.95ZnO$ and $0.10Fe_2O_3/0.90ZnO$ have been prepared and investigated by using ferromagnetic resonance (FMR) method. Samples were characterized by XRD method.

Figures 1 and 2 present the FMR spectra taken at different temperatures for both samples. The temperature dependence of parameters describing the FMR spectrum for both samples is shown in Figs. 3-5.

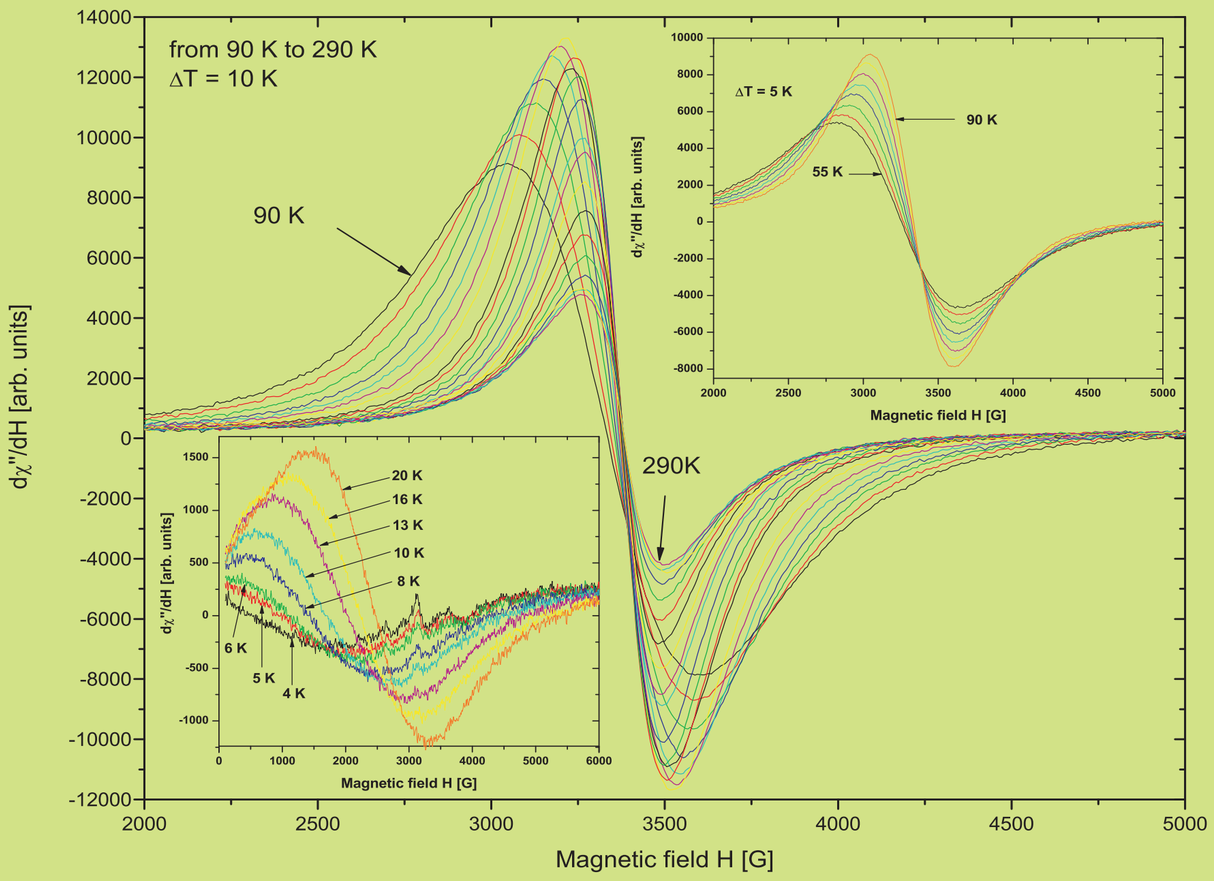


Figure 1: FMR spectra of $0.05Fe_2O_3/0.95ZnO$ registered at different temperatures.

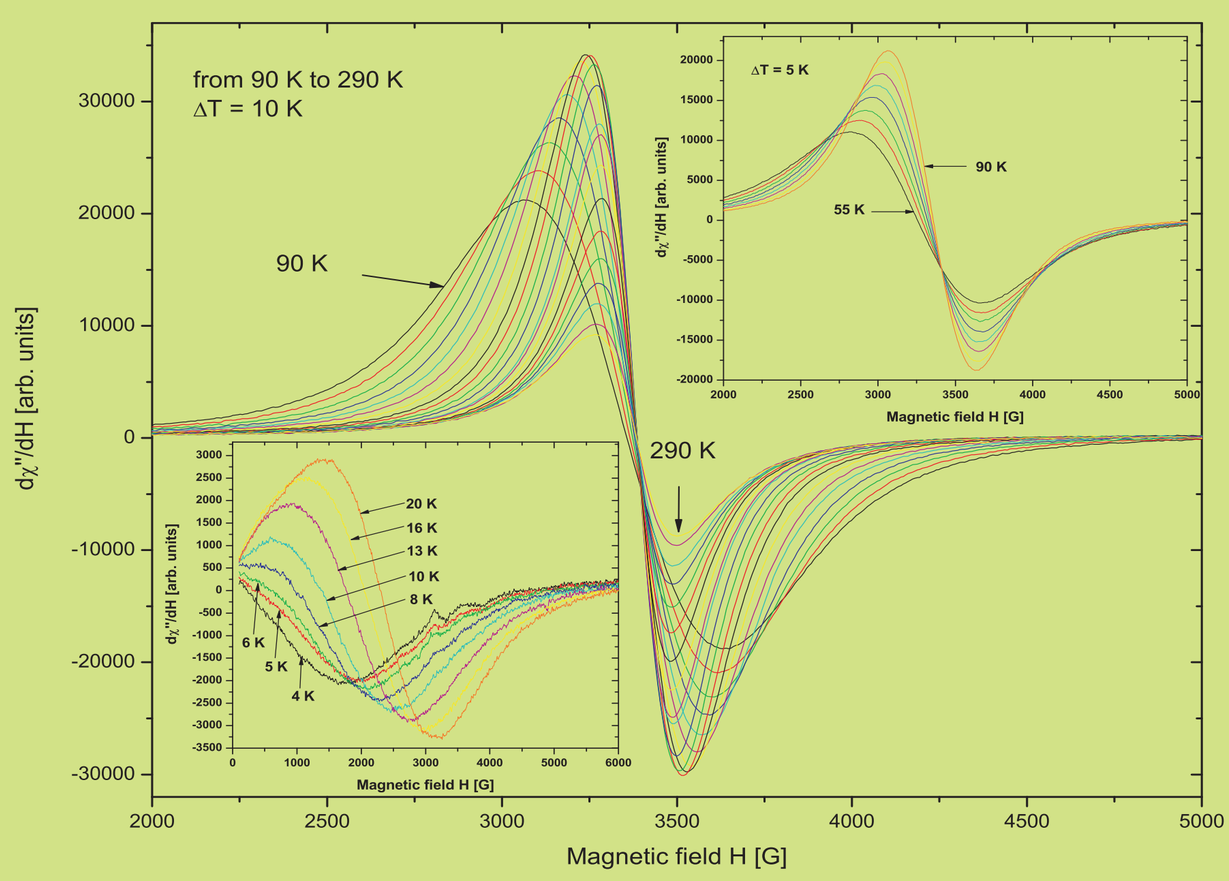


Figure 2: FMR spectra of $0.10Fe_2O_3/0.90ZnO$ registered at different temperatures.

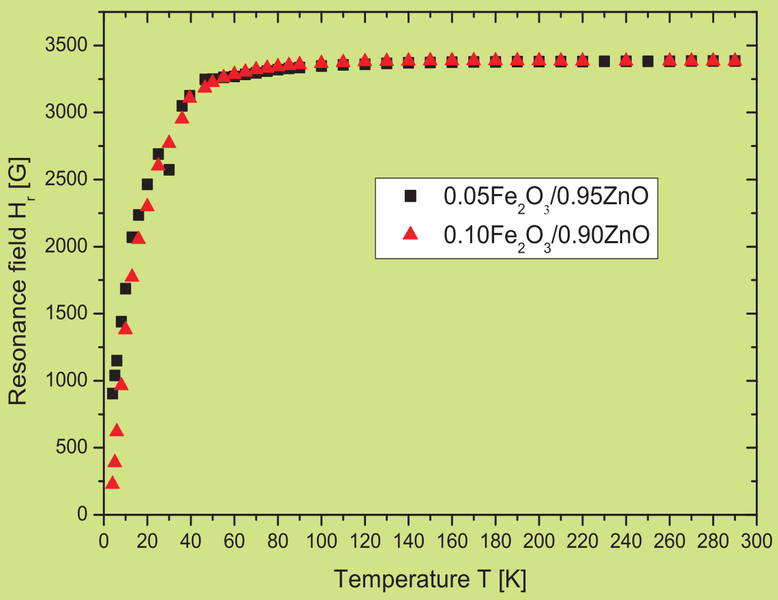


Figure 3: Temperature dependence of FMR resonance fields of $0.05Fe_2O_3/0.95ZnO$ and $0.10Fe_2O_3/0.90ZnO$ samples.

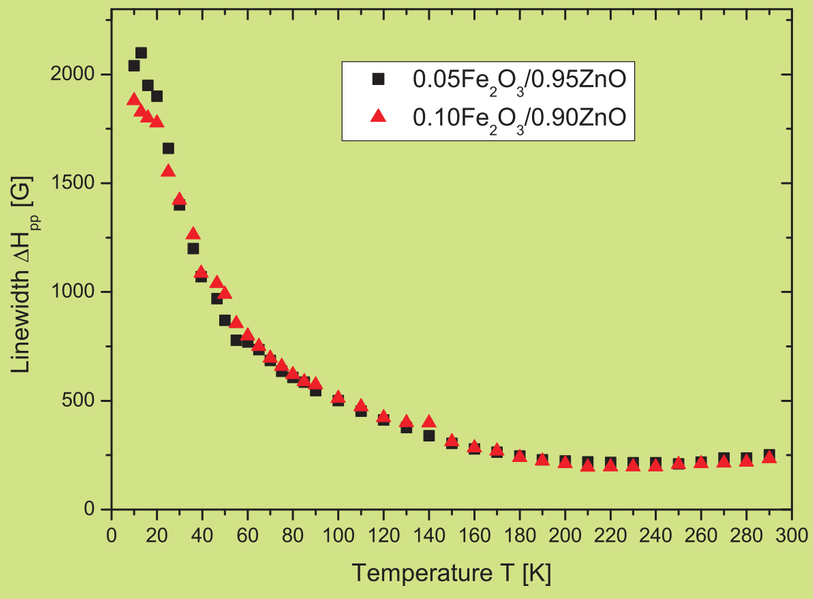


Figure 4: Temperature dependence of FMR linewidths of $0.05Fe_2O_3/0.95ZnO$ and $0.10Fe_2O_3/0.90ZnO$ samples.

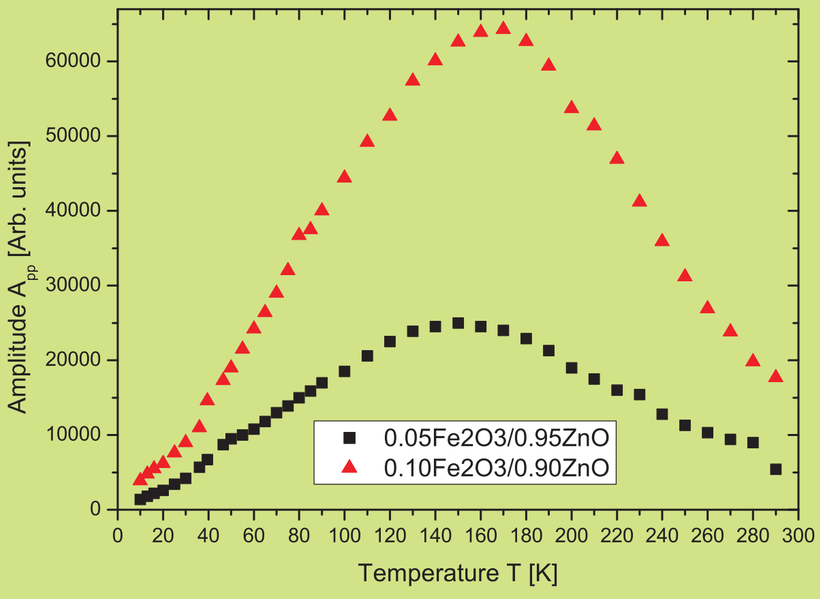


Figure 5: Temperature dependence of FMR signal amplitudes of $0.05Fe_2O_3/0.95ZnO$ and $0.10Fe_2O_3/0.90ZnO$ samples.

Strong temperature dependence is observed for three important parameters: apparent resonance field ($H_r$), linewidth ($H_{pp}$) and amplitude ($A_{pp}$). Essential differences between both samples are recorded in the low temperatures range that could be accounted for by differences in concentration of magnetic nanoparticles. Strong differences observed for the resonance amplitude signal (Fig. 5) in both samples are attributed to differences in the blocking temperature of the superparamagnetic state: $T_b$=150 K for sample with lower concentration, and $T_b$=170 K for sample with higher concentration of magnetic nanoparticles.