

# Surface degradation of magnetite nanoparticles

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## Abstract

Understanding external action process that causes degradation of magnetite nanoparticle surface are important to predict the issue of stability in applications. In this present work only treat the catalytic action of a corrosive agent on the surface of magnetite nanoparticles in time for six months.

The magnetic nanoparticles of magnetite were prepared by the coprecipitation method, using ferric chloride, ferrous chloride and ammonium hydroxide, heated at 70 °C in the presence of magnetic stirring. We used a volume of 9 ml of ammonium chloride solution to attack the surface of 1 g of magnetite superparamagnetic nanoparticles by six month.

UV-VIS absorption and excitation energy measurements were performed in the range of 190-1100 nm as shown in Figure 1 and Figure 2.

The linewidth as a function of concentration and time showing the surface of the nanoparticle suffer degradation over time with increasing concentration (Figure 3).

The energy spectra as a function of wavelength possible chemical moieties present on the respective frequencies of electronic transitions for chloride ions, ammonium, water and magnetite.

Photothermal measurements were performed using a diode laser source 10 mW in the wavelength range 600 to 700 nm as a function of frequency 1-800 Hz (not shown).

## References

- [1] S. Kalia, S. Kango, A. Kumar, Y. Haldorai, B. Kumari, R. Kumar, Colloid Polym Sci. 292, (2014) 2025–2052.
- [2] E. G. Barbagiovanni, D. J. Lockwood, P. J. Simpson, and L. V. Goncharova, Journal of Applied Physics 111, (2012) 034307.

## Figures

Figure 1. Spectra *UV-VIS* absorption at concentrations of 5, 20, 40, 60 and 80 of ammonium chloride solution to catalytic action at the surface of magnetite nanoparticles.

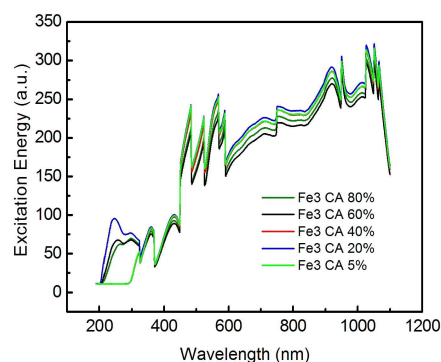
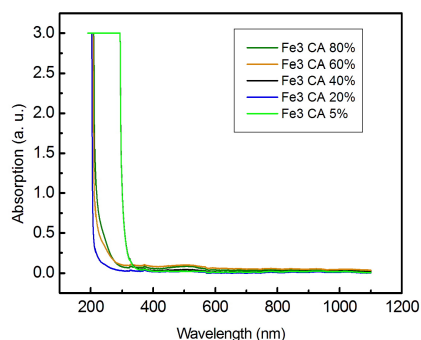


Figure 2. Energy spectra of *UV-VIS* excitation at a concentration of 5, 20, 40, 60 and 80% ammonium chloride solution to catalytic action at the surface of magnetite nanoparticles.

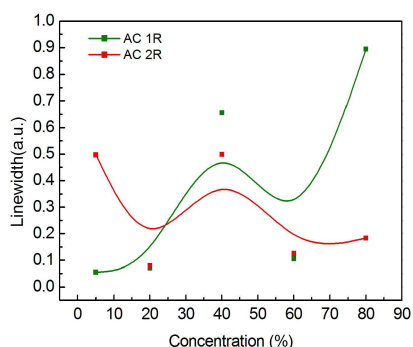


Figure 3. Linewidth of Absorption of *UV-VIS* spectra in the concentration 5, 20, 40, 60 and 80 ammonium chloride solution for catalytic action in surface of magnetite nanoparticle.