SYNTHESIS AND CHARACTERIZATION OF ZN NANOFERRITES

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Fe_2ZnO_4, nanopowders were prepared by hydrotermal method at 160ºC. The structure of magnetic powders were characterized by X-ray diffraction, thermal gravimetric analysis and scanning electron microscopy, while magnetic properties at 300K and 5K were determined by using a SQUID magnetometer working at 100 Oe.

XRD patterns of Fe_2ZnO_4 nanopowder and Fe_2ZnO_4 Franklinite were shown in Fig.1. All the diffraction peaks in the XRD patterns of Fig. 1 can be indexed to face center cubic structure of Iron ferrite, Franklinite, according to JCPDS card No. 22-1012

We can observe for Fe_2ZnO_4 nanopowder low intense and broad diffraction peaks characteristic of low crystallinity and low particule size.

Magnetic characterization of Fe_2ZnO_4 nanopowder obtained by hydrothermal method, Figure 2, shows a characteristic strait hysteresis loop with a saturation magnetic moment of 2 emu at 300K and 8 emu at 5K. These high saturation magnetic moment for this Fe_2ZnO_4 nanopowder are lower than ferromagnetic Franklinite. These results are characteristic of the new superparamagnetic materials.

Fig.3. display the Zero Field Cooling (ZFC) and Field Cooling (FC) curves magnetization measurements of Fe_2ZnO_4 nanopowder shown two broad maximum at temperature as lowest of 21.8K. This may indicate that there are strong interactions between the particles modified by their samall size.

High electric resistivity of ceramic ferrites and straight hysteresis loop are interesting for electric power energy transformation due to low parasitic energy lost specially at high frecuency.

References:

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Figures:

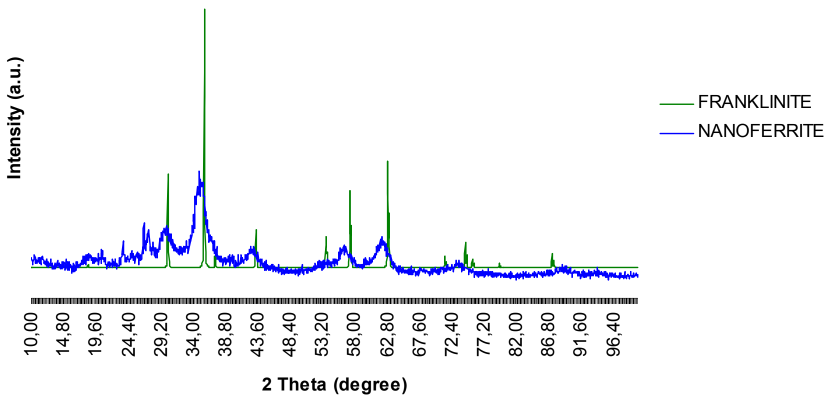

Fig. 1. XRD patterns of $Fe_2\ ZnO_4$ nanopowder and $Fe_2\ ZnO_4$ Franklinite.

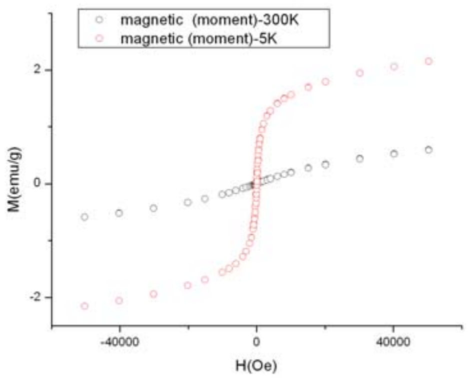

Fig. 2. Magnetic hysteresis loop for of Fe_2ZnO_4 nanopowder at 5K and 300K.

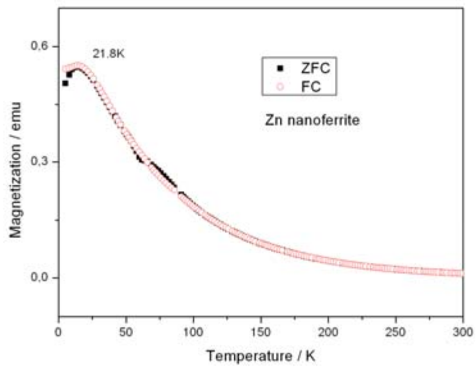

Fig. 3. Zero Field Cooling (ZFC) and Field Cooling (FC) magnetization measurements of Fe_2ZnO_4 nanopowder.