

## Preparation of $\text{Co}_{1-x}\text{Ni}_x\text{Fe}_2\text{O}_4$ nanoparticles by coprecipitation method

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CoNi ferrite nanoparticles are strongly expected to be useful as a high density magnetic recording media. The CoNi ferrite (film) have prominent perpendicular magnetic anisotropy, exhibiting coercive force (Hc) up to 3 KOe, which is comparable to or higher than that of the conventional CoCr perpendicular magnetic recording media [1].

In this research,  $\text{Co}_{1-x}\text{Ni}_x\text{Fe}_2\text{O}_4$  nanoparticles were prepared by a coprecipitation method. The effects of alkaline source and the ratio of Co/Ni are investigated on the particles shape and magnetic properties of  $\text{Co}_{1-x}\text{Ni}_x\text{Fe}_2\text{O}_4$  nanoparticles. The prepared precursor of  $\text{Co}_{1-x}\text{Ni}_x\text{Fe}_2\text{O}_4$  was annealed at 400, 500, and 600 °C for 1 hour. The particle shape and magnetic properties of samples were characterized by FE-TEM and VSM, respectively.

As a result, the physical properties of  $\text{Co}_{1-x}\text{Ni}_x\text{Fe}_2\text{O}_4$  nanoparticles such as particle size, crystalline phase, magnetic properties depended largely on the ratio of Co/Ni and precipitating agent as well as annealing temperature. The use of NaOH as a precipitating agent produced nanoparticles of magnetite ( $\text{Fe}_3\text{O}_4$ ) phase with a small part of impurity. However, amorphous nanoparticles were obtained when  $\text{NH}_4\text{OH}$  was used. After annealing of amorphous nanoparticles in the range of 400 ~ 600°C for 1hour, the coercive force of the nanoparticles increased with the increase of particle size by annealing. As shown in Fig.1, the abnormally increased coercive force of about 1750 Oe was measured for  $\text{Co}_{0.75}\text{Ni}_{0.25}\text{Fe}_2\text{O}_4$  with 20~30nm size, which was produced by annealing of amorphous nanoparticles at 500°C for 1 hour.

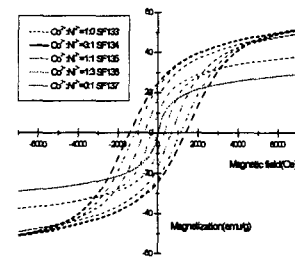


Fig. 1. Magnetic properties of  $\text{Co}_{1-x}\text{Ni}_x\text{Fe}_2\text{O}_4$  nanoparticles at 500°C, 1h.

### References

- [1] F.Zang, S.Kantake, Y. Kitamoto, and M. Abe, IEEE Trans. Mag. 35, 2751 (1999)