

Preparation of Water based Magnetic Fluid with the Spent Iron Catalyst by Mechanochemical Method

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1. INTRODUCTION

The water-based magnetic fluid was prepared with a spent iron catalyst by mechanochemical method and coated surfactants to the surface of magnetite particles. In this study, not only good magnetic fluid was prepared with the spent iron catalyst for the first time, but also the spent iron catalyst was recycled in an effective way to reduce environmental pollution.

2. EXPERIMENT

The experiment was done by the means of changing the ratios of ball, sample and water; ball diameter; various surfactants; and coating conditions. A difficulty associated with the preparation of magnetic fluid is that the particles have large surface area-to-volume ratios and thus tend to aggregate to reduce their surface energy[1]. First, the different ball diameter, the different weight ratio of ball:sample:water was investigated by experiment. Second, the particles were coated by different coating conditions. Magnetic fluid is stable colloidal suspension composed of single-domain magnetic nanoparticles dispersed in appropriate solvents[2]. The characters of magnetic fluid was analyzed by PSA, VSM and XRD.

3. CONCLUSION

The water based magnetic fluid was prepared with the iron oxide catalyst for the first time. The saturated magnetization of the water based magnetic fluid was up to 22.09 emu/g. The optimum mechanochemical conditions are the weight ratio of ball:sample:water as 2000:100:100 at 80 °C, 60 hours grinding time. The spent catalyst was reused to change into useful magnetic fluid, at the same time, it will reduce environmental pollution.

4. REFERENCE

- [1] B.Berkovski, Magnetic Fluids and Applications Handbook. New York Wallingford(UK), Begell House, Inc.
- [2] Lifen Shen, Paul E. Laibinis, T. Alan Hatton, J.Magn. Magn. Mater.,194, P37-44,1999.