

Pengaruh High Energy Milling (HEM) terhadap Harga Magnetoresistance (MR) pada Sistem Komposit Co-Al₂O₃

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Abstrak

Telah dilakukan penelitian dengan proses High Energy Milling (HEM) SPEX 8000 selama 1,5 jam ; 4,5 jam ; 12 jam dan 20 jam terhadap serbuk Cobalt (Co) yang dicampurkan dengan serbuk Alumina (Al₂O₃). Perbandingan komposisi material tersebut adalah (36 : 64) (at%) sehingga terbentuk sistem komposit Co-Al₂O₃. Dihipotesakan bahwa sifat magnetoresistance (MR) dari bahan tergantung pada besarnya fasa Co-hcp dan fasa Co-fcc dari material tersebut. Konfirmasi dengan menggunakan peralatan four point probe, diperoleh harga MR 0,1 % ; 5,25% ; 5,3% dan 9,4% masing-masing untuk sistem komposit Co-Al₂O₃ pasca milling 1,5 jam ; 4,5 jam ; 12 jam dan 20 jam. Dimana sampel berbentuk pellet. Keberadaan fasa Co-hcp diketahui lebih dominan dibandingkan dengan fasa Co-fcc pada cuplikan awal bahan dasar cobalt. Diketahui pula dari pengukuran Vibrating Sample Magnetometer (VSM) harga saturasi magnetik bahan menunjukkan penurunan dari 116 emu/gram menjadi 36.1 emu/gram masing-masing untuk cuplikan pasca milling 1,5 jam sampai 20 jam. Hal ini menunjukkan bahwa proses milling membuat keberadaan fasa Co-hcp menurun dan fasa Co-fcc meningkat. Hasil-hasil di atas terlihat konsisten dengan hasil penelitian pada sistem Co-Al₂O₃ film tipis.

.....There has been a study using High Energy Milling (HEM) SPEX 8000 for 1.5 hours, 4.5 hours, 12 hours and 20 hours to Cobalt (Co) dust mixed with Alumina (Al₂O₃) dust. Comparison of the composition material is (36 : 64) (at%), so at the end it will produce Co-Al₂O₃ composite system. It is assumed that magnetoresistance (MR) characteristic of the material depends on volume of Co-hcp phase and Co-fcc phase of the material. Confirmed by using four point probe device, it gains value of magneto resistance about 0.1 %, 5.25%, 5.3% and 9.4 % each for a basic material of Co-Al₂O₃ composite system after 1.5 hours, 4.5 hours, 12 hours and 20 hours milling process. The sample is in pellet shape. The existence of phases Co-hcp is known more dominant if we compare with Co-fcc phases on basic Cobalt. It is also defined that from magnetic saturation measurement Vibrating Sample Magnetometer (VSM) of the material, it shows a decline from 46.2 emu/ gram to 36.1 emu/gram of each basic material after 12 and 20 hours milling process. This shows that milling process makes Co-hcp phase decreases and Co-fcc increases. The statement above defines that there is a consistency with the research result on thin film Co-Al₂O₃ system.