Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Mechanochemical synthesis of submicron sized Nd-Fe-B particles using planetary ball mill OZLEM KOYLU-ALKAN, GEORGE C. HADJIPANAYIS, University of Delaware, DAVID J. SELLMYER, University of Nebraska — Mechanochemical synthesis of $Nd_2Fe_{14}B$ particles with size below 0.5 μm is done via planetary ball mill, followed by annealing of rare-earth oxides, iron oxide and boron oxide in the presence of a reducing agent (Ca) and a dispersant material (CaO). Compared to high energy ball mill, planetary mill gives a range in milling energy. Our purpose is to control the particle size and size distribution by changing the milling energy. In preliminary work, annealed particles in the CaO dispersant with coercivity 4.7 kOe were produced. After washing off the dispersant due to the interstitial modification of 2:14:1 phase with hydrogen, coercivity of the particles was decreased to 1.2 kOe. Electron micrographs of the samples showed that rectangular $Nd_2Fe_{14}B$ particles are present with size distribution in the submicron range. The aim of this study is to obtain nanoparticles with a size below 500 nm and study the effect of size and surface on their magnetic properties. Work supported by DOE DE-FG02-04ERU612.

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Date submitted: 15 Nov 2013 Electronic form version 1.4