Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Changes in magnetic properties of cobalt-iron-titanium oxide due to temperature variations[1] CAJETAN NLEBEDIM[2], Ames Laboratory, U.S. Department of Energy, DAVID JILES[3], Department of Electrical and Computer Engineering, Iowa State University — It has been found that the magnetic properties of cobalt ferrite such as magnetization, Curie temperature, including the electrical and structural properties can be tailored in a remarkably linear pattern by substituting titanium and controlling its concentration. The dependence of magnetocrystalline anisotropy and coercivity on temperature variations was found to be different compared to previous studies on cation substitution in cobalt ferrite. For example, we found a competition between magnetocrystalline anisotropy and microstructure in controlling coercivity; one dominating at higher concentration of substitution and the other dominating at lower concentration. It was also found that, while magnetocrystalline anisotropy controls the temperature dependence of coercivity, obstruction to domain wall processes by pinning sites in the microstructure controls the compositional dependence of coercivity. The physics of magnetism controlling the observed properties and how those depend on temperature variations will be presented. Such understanding is necessary for the application of the material in device development.

[1]This work was supported by the USDoE, Office of Science, Basic Energy Sciences, Materials Science and Engineering Division. The research was performed at Ames Laboratory, operated for the U.S. DOE by Iowa State University (contract #DE-AC02-07CH11358).
[2]Also affiliated to Department of Electrical and Computer Engineering, Iowa State University
[3]Also affiliated to Ames Laboratory, U.S. Department of Energy

Cajetan Nlebedim
Ames Laboratory, U.S. Department of Energy

Date submitted: 14 Nov 2014 Electronic form version 1.4