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**How Magnesium Substitution Changes the Magnetostrictive Properties of Cobalt Ferrite** DAVID C. JILES, Department of Electrical and Computer engineering, Iowa State University, CAJETAN NLEBEDIM, Ames Laboratory, US DOE, Iowa State University, RAVI HADIMANI, Department of Electrical and Computer engineering, Iowa State University, RUSLAN PROZOROV, Department of Physics and Astronomy, Iowa State University — Materials based on cobalt ferrite are promising for magnetostrictive applications. Significant research effort has been invested towards understanding the effects of substituting different cations into the spinel crystal lattice of cobalt ferrite on its magnetostrictive properties. Al and Mg are the two cations that occupy the tetrahedral and octahedral sites of the spinel ($MgAl_2O_4$) from which cobalt ferrite derives its crystal structure. In our previous study, compared with other cation substituted cobalt ferrite studies, Al substitution resulted in the best compromise in magnetostriction and strain sensitivity. In this study, we present the effects of substituting Mg for Fe in cobalt ferrite. It was found that Mg substitution resulted in a near-linear decrease in magnetization of the samples. Remarkably, both magnetostriction and strain sensitivity showed a similar dependence on Mg substitution. This trend is unlike previous observations in which both properties show opposite dependence on cation substitution at lower concentrations of the substituted cations.

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