Strong effect of low-dimensional Fe-doped cobalt niobate on a strongly ferrimagnetic system \(^1\) CAJETAN NLEBEDIM, Ames Laboratory, U.S. Department of Energy, DAVID JILES, Department of Electrical and Computer Engineering, Iowa State University — In this work, the first investigation of the effect of Fe-doped cobalt niobate (CoNb\(_2\)O\(_6\)) imbedded in the matrix of a strongly ferrimagnetic cobalt-iron oxide, is presented. The temperature dependence of the magnetic properties and how they change with variations in the concentration of CoNb\(_2\)O\(_6\) is also presented. CoNb\(_2\)O\(_6\) is a prototypical low-dimensional material belonging to the pyrochlore-type AB\(_2\)O\(_6\) systems. Its low-dimensional magnetic characteristics can help in understanding the magnetic properties of higher order systems. It has been investigated for applications in resonators and capacitors. This work shows that the magnetization of the ferrimagnetic phase is strongly affected by the concentration of Co ions in the low-dimensional phase, below 15 K but changes in coercivity with temperature were predominantly due to the ferrimagnetic phase. The systematic variation in the concentration of both phases and the cation ratio in each phase, enable us to understand the variation of the magnetic properties with temperature. This work provides useful insights into tuning the magnetism in strongly magnetic materials with transition metal AB\(_2\)O\(_6\) systems imbedded in their matrices.

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David Jiles
Dept of Electrical and Computer Engineering, Iowa State University

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