

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Properties of Nonstoichiometric  $\text{SrRu}_{1-v}\text{O}_3$**

**Perovskites**<sup>1</sup> B. DABROWSKI, S. KOLESNIK, O. CHMAISSEM, J. MAIS, Department of Physics, Northern Illinois University, M. AVDEEV, J.D. JORGENSEN, Materials Science Division, Argonne National Laboratory — Annealing of stoichiometric  $\text{SrRuO}_3$  perovskites in high-pressure oxygen of 600 atm. near  $1100^\circ\text{C}$  produces  $\text{SrRu}_{1-v}\text{O}_3$  compounds with vacancies on the Ru-sites. The creation of Ru vacancies rapidly suppresses the ferromagnetic ordering temperature,  $T_C$ , from 163 K to 45 K with increase of  $v \approx 0.09$ . The resistivity shows a metallic behavior near room temperature with progressively more insulating behavior at low temperatures for increasing  $v$ . All samples display clear metallic-like decrease of the resistivity and negative magneto-resistance right below  $T_C$ . Structural changes that accompany creation of Ru-site vacancies indicate reduced charge screening caused by the Ru-vacancies that offsets expected decrease of the average interatomic distance Ru–O. The  $b$  and  $c$  lattice parameters and the unit cell volume are virtually temperature independent for the stoichiometric material below  $T_C$ . We show that this previously reported invar-effect originates from freezing of the octahedral tilting about the  $[001]$  axis that can be observed for both stoichiometric and Ru-deficient samples. Spontaneous magnetostriction has the largest effect on the  $b$  axis of the orthorhombic  $Pbnm$  crystal structure.

<sup>1</sup>Supported by NSF (DMR-0302617), the U.S. Dept. of Education, and U.S. Dept. of Energy, BES Materials Sciences (W-31-109-ENG-38)

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Date submitted: 19 Nov 2004

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