Transport and Raman signatures of electron-doped SmNiO$_3$ thin films

KOUSHIK RAMADOSS, School of Materials Engineering, Purdue University, West Lafayette, IN 47907, NIRAJAN MANDAL$^1$, Department of Physics, Purdue University, West Lafayette, IN 47907, YOU ZHOU, School of Engineering and Applied Sciences, Harvard University, Cambridge, MA 02138, YONG CHEN$^2$, Department of Physics, Purdue University, West Lafayette, IN 47907, SHRIRAM Ramanathan, School of Materials Engineering, Purdue University, West Lafayette, IN 47907 — We report low temperature transport and Raman spectroscopy measurements of electron-doped SmNiO$_3$ (SNO) thin films. It has been shown that pristine SNO films can be doped with electrons using hydrogen. Our transport measurements indicate a Coulomb interaction dominated variable range hopping (VRH) for electron-doped samples whereas the pristine films show a Mott type VRH mechanism at low temperatures. The electron-doped samples display a strong localization which can be correlated with the high spin state of Ni$^{2+}$ ions. The spatial Raman map shows a remarkable shift of about 167 cm$^{-1}$ with electron doping thus serving as a spectroscopic tool to investigate hydrogen in our films. References


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