Structures and properties of Ni$^{1+/2+}$ nickelates with infinite NiO$_2$ layers

KONSTANTIN LOKSHIN, TAKESHI EGAMI, University of Tennessee, VIKTOR POLTAVETS, MARTHA GREENBLATT, Rutgers University — Layered mixed valence Ni$^{1+/2+}$ nickelates possess similar crystal and electronic structures to Cu$^{2+/3+}$ high temperature superconducting cuprates. Only a few Ni$^{1+/2+}$ nickelates have been identified and their properties have not been reported so far. We present a first systematic study of Ln$_{n+1}$Ni$_n$O$_{2n+2}$, Ln = La or Nd, which structures could be described as an intergrowth of \{LnO$_2$\} fluorite and infinite layer \{LaNiO$_2$\)$_n$ blocks. The crystal structures of the new Ln$_3$Ni$_2$O$_6$, Ln$_4$Ni$_3$O$_8$, Ln$_5$Ni$_4$O$_{10}$ phases have been confirmed by X-ray and neutron powder diffraction. X-ray absorption spectroscopy data proves the 1+/2+ oxidation state and planar coordination of Ni atoms. Magnetic susceptibility data of Ln$_{n+1}$Ni$_n$O$_{2n+2}$ will be discussed.

Konstantin Lokshin
University of Tennessee

Date submitted: 01 Dec 2006