Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Single crystal preparation and long-range charge fluctuations in the square-planar nickelate La4Ni3O8.[1] JUNJIE ZHANG, Argonne National Laboratory, YU-SHENG CHEN, Argonne National Laboratory/The University of Chicago, HONG ZHENG, DANIEL PHELAN, JOHN MITCHELL, Argonne National Laboratory — Since the discovery of high-Tc superconductivity in cuprates, intensive effort has been focused on a search for superconductivity in related materials, with particular attention on nickelates. Bulk nickelates containing square-planar coordinated Ni+ are of interest because Ni1+ is isoelectronic with Cu2+, the building block of high-Tc cuprates. Here we report the first single crystal synthesis of La4Ni3O8, a layered nickelate containing square-planar coordinated Ni^{+} with crystallographic and electronic structure related to that of cuprates. Magnetic susceptibility, resistivity, and heat capacity measurements confirm the reported phase transition at ˜105 K[1]. Long-range charge fluctuations with q˜(1/3, 1/3, L) was observed for the first time through synchrotron X-ray single crystal diffraction. Our results challenge the current understanding of the origin of the phase transition. Availability of bulk La4Ni3O8 single crystals is also of significant importance for unraveling its ambiguous ground-state magnetic structure, the spin state of the Ni ion, and potential for superconductivity in nickelates involving Ni+ in a square-planar coordination. [1] Poltavets, V. V. et al. PRL 2010, 104, 206403.

[1]Work in the Materials Science Division at Argonne National Laboratory was supported by the U.S. Department of Energy, Office of Science, Basic Energy Sciences, Division of Materials Science and Engineering.

Junjie Zhang
Argonne Natl Lab

Date submitted: 05 Nov 2015 Electronic form version 1.4