Crystal Growth of the $S = 1/2$ Antiferromagnet $K_2PbCu(NO_2)_6$ Elpasolite

LIANYANG DONG, Department of Chemical and Biomedical Engineering, FAMU-FSU College of Engineering; National High Magnetic Field Laboratory, Florida State University, TIGLET BESARA, National High Magnetic Field Laboratory, Florida State University, THEO SIEGRIST, Department of Chemical and Biomedical Engineering, FAMU-FSU College of Engineering; National High Magnetic Field Laboratory, Florida State University — The elpasolite $K_2PbCu(NO_2)_6$ is known for its two structural transitions at 281 K and 273 K. Single crystals of $K_2PbCu(NO_2)_6$ have been grown in aqueous solution, but the rapid nucleation rate and convective transport renders it difficult to obtain large high quality single crystals. We developed a gel method to grow $K_2PbCu(NO_2)_6$ Elpasolite with sizes up to 5x5x5 mm$^3$, suitable for neutron diffraction measurements. Susceptibility measurements clearly show that the Jahn-Teller distortions at 286K and 273K with associated orbital ordering produce a linear chain Heisenberg antiferromagnetic system. The intrachain interaction strength has been derived from a Bonner-Fisher analysis that yielded a value of 5.4K.

This work was supported by the National Science Foundation, under award DMR-1534818. A portion of this work has been performed at the National High Magnetic Field Laboratory, which is supported by the National Science Foundation Cooperative Agreement.

Lianyang Dong
Florida State University

Date submitted: 20 Nov 2016
Electronic form version 1.4