Electrical properties of a layered manganese vanadate

VICTORIA SOGHOMONIAN, QIFAN YUAN, Virginia Tech, Physics, ELINOR SPENCER, NANCY ROSS, Virginia Tech, Geosciences — We present the electrical characteristics of a layered manganese vanadate. Octahedral Mn and tetrahedral V units form layers that in turn are connected to each other via weakly bonded strontium ions. The Mn sites are also connected to each other through bridging oxygen atoms that are partially protonated, allowing for possible proton conduction in the material. The conductivity is dependent on crystal direction. Variable temperature conductivity measurements, from 160 to 830 K, show semiconducting behavior with average activation energy of 0.35 eV. Around 670 K a dip in the conductivity is observed, correlated with loss of water from the structure inferred from thermogravimetric analysis. Above 760K, an increase in conductivity is observed. Single crystal x-ray analysis is performed on samples heated above 670 K, to probe temperature induced structural changes. Preliminary results show a contraction of one of the unit cell axes corresponding to the loss of the bridging oxygen and the ensuing movement of the two Mn sites closer to each other. Single crystal x-ray investigations of the material under hydrostatic pressure in a DAC are also performed, to probe the influence of structural changes on electronic transport properties.

1We acknowledge support from NSF DMR-0943971

Victoria Soghomonian
Virginia Tech, Physics

Date submitted: 11 Nov 2011