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Electrical properties of a layered manganese vanadate¹

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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.

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