

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Metal-insulator transition in $AV_{10}O_{15}$ (A=Ba,Sr) T. KATSUFUJI, T. SUZUKI, T. KAJITA, Dept. Phys., Waseda Univ. — In $AV_{10}O_{15}$ (A=Ba, Sr), the V ions take a mixed-valence state, $V^{2.8+}$ ($3d^{2.2}$), and form a modified triangular lattice, in which V triangles are periodically missing from a normal triangular lattice. It is known that $BaV_{10}O_{15}$ undergoes a structural phase transition at around 120 K. We have succeeded in growing large single crystals of $AV_{10}O_{15}$ (A=Ba, Sr) by a floating-zone method. We found a large jump of electrical resistivity by $\sim 10^3$ times at the structural transition temperature (123 K) of $BaV_{10}O_{15}$, which can be regarded as a metal-insulator transition presumably dominated by a charge/orbital ordering of V. We also found an antiferromagnetic ordering at 43 K in the same compound. On the other hand, $SrV_{10}O_{15}$ did not show any structural anomaly down to the lowest temperature, and a spin-glass behavior was observed. These results indicate a strong correlation between the structural anomaly (charge/orbital ordering) and the magnetism in this series of compounds. We also measured the optical reflectivity of $BaV_{10}O_{15}$ and found the opening of a charge gap in the optical conductivity spectrum at low temperatures.

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Date submitted: 21 Nov 2008

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