

# Transport properties of the $\text{Ni}_2\text{MV}_3\text{O}_{11}$ (M(II)=Cr and Fe) and $\text{M}_3\text{Fe}_4(\text{VO}_4)_6$ (M(II)=Mg and Mn) compounds

N. Guskos<sup>1,2</sup>, J. Typek<sup>2</sup>, K. Karkas<sup>1</sup>, A. Guskos<sup>2</sup>, A. Błońska-Tabero<sup>3</sup>  
and M. Bosacka<sup>3</sup>

<sup>1</sup>Department of Physics, University of Athens, Panepistimiopolis, 15 784 Zografos, Athens, Greece

<sup>2</sup>Institute of Physics, West Pomeranian University of Technology, Al. Piastow 48, 70-311 Szczecin, Poland

<sup>3</sup>Department of Inorganic and Analytical Chemistry, West Pomeranian University of Technology, Al. Piastow 17, 70-310 Szczecin, Poland

Transport properties of the multicomponent vanadate oxides  $\text{Ni}_2\text{MV}_3\text{O}_{11}$  (M(II)=Cr(II) and Fe(III)) and  $\text{M}_3\text{Fe}_4(\text{VO}_4)_6$  (M(II)=Mg(II) and Mn(II)) have been investigated by electrical conductivity measurements. All compounds exhibit semiconducting behavior. Former two samples have shown many orders of magnitude (over  $10^5$  times at RT) better conducting properties than the later two (see Fig.1). Replacement of the magnetic Cr(II) cation with magnetic Fe(III) ion in  $\text{Ni}_2\text{MV}_3\text{O}_{11}$  results in a significant increase of its electrical conductivity at RT and an increase of the activation energy. Very low conductivity is registered in  $\text{M}_3\text{Fe}_4(\text{VO}_4)_6$  system in which replacement of a non-magnetic Mg(II) ion with magnetic Mn(II) ion causes a strong decrease of conductivity. The system  $\text{M}_3\text{Fe}_4(\text{VO}_4)_6$  possessing many sublattices with magnetic ions and displaying competing magnetic interactions might be susceptible to drastic changes of their transport properties by ion replacements.

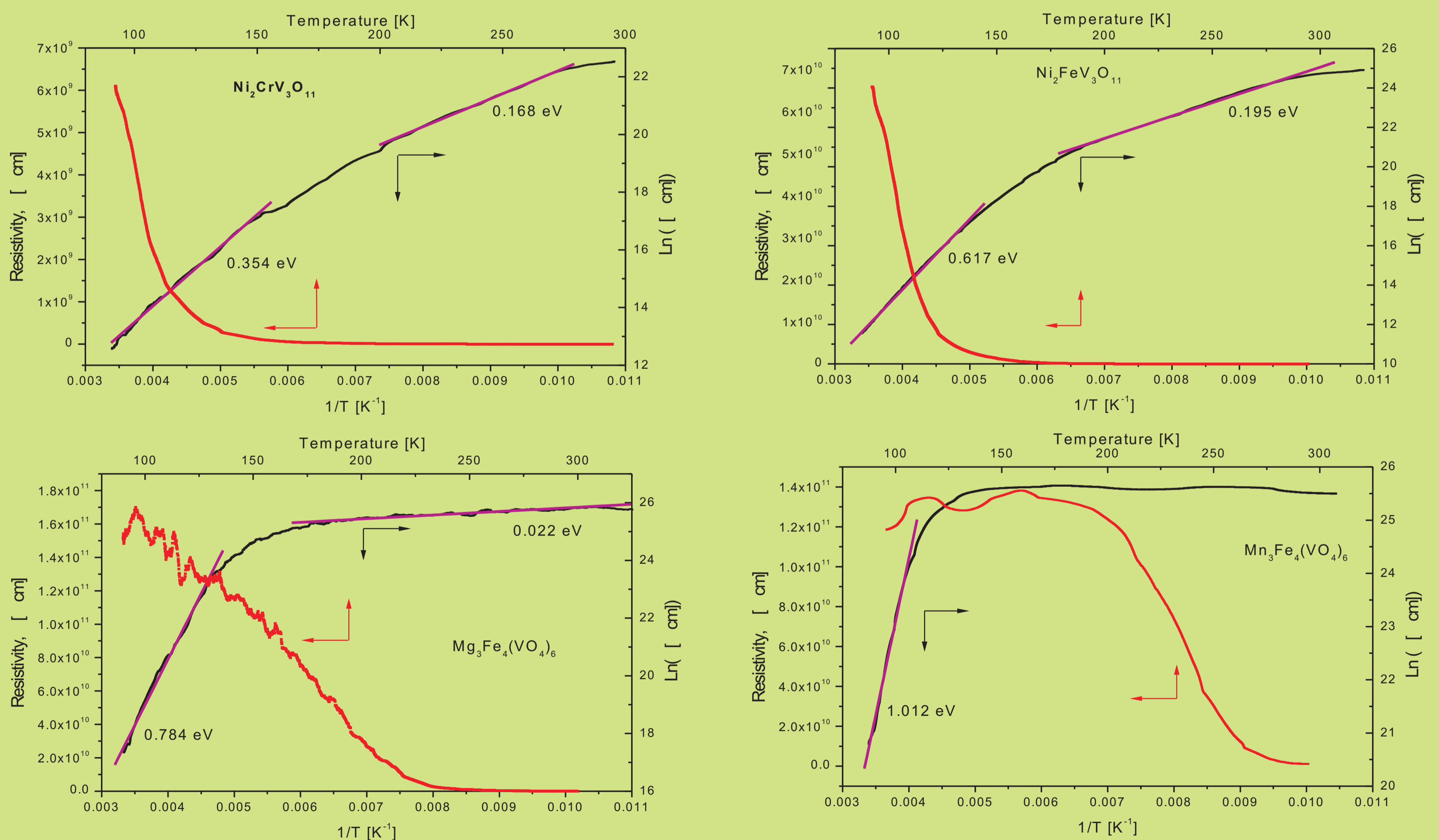


Fig. 1 Temperature dependence of the resistivity for four different multicomponent vanadate oxides.

## Acknowledgements

Publication of this paper was realised with partial financial support from the budget resources of the West Pomeranian Voivodeship.