Continuous metal-insulator transition at 410 K of the 5d oxide $NaOsO_3$

K. Yamaura

Superconducting Materials Center, National Institute for Materials Science, Tsukuba, Japan

The perovskite $NaOsO_3$ shows a Curie-Weiss metallic nature at high temperature, and suddenly turns into an insulating state on cooling at 410 K [1] . The metal-insulator transition (MIT) is coupled with an antiferromagnetic transition. Electronic specific heat is absent at the low-temperature limit, suggesting that the band gap fully opens. In situ observation in electron microscopy undetected any lattice anomalies associated with the MIT. Differential scanning calorimetry indicated that the MIT has little thermal hysteresis. The features are qualitatively comparable with what were observed for $Cd_2Os_2O_7$ (T_{MIT} = 226 K) [Mandrus *et al.*, PRB 2001], and not at all with what were observed for $LnNiO_3$ (Ln = Pr, Nd, Sm) [Lacorre *et al.*, J. Solid State Chem. 1991]. In this talk an overview of our research is presented and a possible mechanism of the MIT of $NaOsO_3$ is discussed. In addition, if time allows, I will introduce new correlated oxides crystalizing in the K_4CdCl_6-type structure (an infinite chain-type structure) recently synthesized such as Ca_3LiOsO_6 [2] and Sr_3CoO_6 [3], which display distinct magnetism.

[1] Y. G. Shi, Y. F. Guo, S. Yu *et al.*, Phys. Rev. B **80**, 161104(R) (2009).
[2] Y. G. Shi, Y. F. Guo, S. Yu *et al.*, J. Am. Chem. Soc. **132**, 8474 (2010).
[3] X. X. Wang, J. J. Li, Y. G. Shi *et al.*, Phys. Rev. B **83**, 100410(R) (2011).