Electrical and Magnetic Property of $ZnCNi_3$

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$MgCNi_3$ has anti-provskite structure where C-Ni_6 octahedron forms the crystal building block. In 2001, He *et al* found that it superconducts at Tc = 8K. We have synthesized $ZnCNi_3$ using the solid state reaction method and found that it has the same structure with $MgCNi_3$. dc-resistivity, magnetic susceptibility, infrared reflectivity, and photoemission spectroscopy have been performed. Temperature dependence of dc-resistivity is similar to that of $MgCNi_3$ but it remains Pauli-paramagnetic down to 2.2K without the onset of superconductivity. Infrared reflectivity shows that the phonon frequency and plasma frequency are almost identical in the two materials. Photoemission spectrum shows that the van-Hove singularity peak is located close to the Fermi energy but it is somewhat broader than that in $MgCNi_3$. We propose that absence of the superconductivity is associated with the reduced density of state at the Fermi level.

keywords : $MgCNi_3$, $ZnCNi_3$, MCN, ZCN