

Ni-site Doping Effect of New Antiperovskite Superconductor ZnNNi₃

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A new superconductor ZnNNi₃ with T_c of about 3 K has the same anti-perovskite-type such as MgCNi₃ and CdCNi₃.¹ The Ni-based anti-perovskite compound has attracted much attention in the context of the relation between superconductivity and ferromagnetism. As far as we know, ZnNNi₃ is the third superconducting material in Ni-based anti-perovskite series and the first superconducting material in anti-perovskite nitride. For this new superconductor, we have studied the Ni-site doping effect. The dopant elements are chosen to be Cu, Co, Fe, Mn, Cr, and V. In Fe and Mn doping, the superconductivity rapidly disappears but survives in V, Cr, Co and Cu cases up to 3, 10, 17 and 2 %-doping, respectively. Interestingly, in Co-doping case, the superconductivity and ferromagnetism coexist at low temperature. It has been revealed that from EPMA analysis the coexistence of superconductivity and ferromagnetism is originated from spatial phase separation of superconducting ZnNNi₃ and ferromagnetic ZnNNi_{0.4}Co_{2.6}, suggesting the existence of miscibility gap of ZnN(Ni, Co)₃ solid solution.

¹M. Uehara, A. Uehara, K. Kozawa and Y. Kimishima, J. Phys. Soc. Jpn. **76**, 0337021 (2009).