Electrical Resistivity of Laves Phase Compounds Containing Transition Elements : I. Fe_2A (A=Sc, Y, Ti, Zr, Hf, Nb, and Ta)(Physics)

Crystal Structures of Pyroxene-Type $ZnSiO_3$ and $ZnMgSi_2O_6$

N. MORIMOTO, Y. NAKAJIMA, Y. SYONO, S. AKIMOTO and Y. MATSUI

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The crystal structures of two pyroxene polymorphs of $ZnSiO_3$, and the orthopyroxene of $ZnMgSi_2O_6$ have been studied. The monoclinic $ZnSiO_3$ crystallizes in the space group $C2/c$ with $a=9{\cdot}787$, $b=9{\cdot}161$, $c=5{\cdot}296$Å, $\beta=111{\cdot}42°$, $Z=8$; orthorhombic $ZnSiO_3$, *Pbca*, $a=18{\cdot}204$, $b=9{\cdot}087$, $c=5{\cdot}278$Å, $Z=16$ and orthorhombic $ZnMgSi_2O_6$, $a=18{\cdot}201$, $b=8{\cdot}916$, $c=5{\cdot}209$ Å, $Z=16$. In the structure of the monoclinic $ZnSiO_3$, Zn atoms are coordinated octahedrally (at M1 sites) and tetrahedrally (at M2 sites). The Zn atoms at the M2 sites are not coordinated by the bridging oxygen [O(3)] of the SiO_3 chains. In the orthorhombic $ZnSiO_3$, however, Zn atoms at the M2 sites have an irregular octahedral coordination including O(3) atoms. Because of the difference in coordination of O(3) to Zn atoms, the shape of the SiO_3 chains in the two polymorphs of $ZnSiO_3$ is different. The structure of the orthorhombic $ZnMgSi_2O_6$ is intermediate between that of enstatite ($MgSiO_3$) and the orthorhombic $ZnSiO_3$. Zn atoms are partially ordered in M1 and M2 sites with site occupancies of 36 and 64% respectively.

Electrical Resistivity of Laves Phase Compounds Containing Transition Elements. I. Fe_2A (A=Sc, Y, Ti, Zr, Hf, Nb, and Ta)

Kôki IKEDA and Takurô NAKAMICHI

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The electrical resistivity of a series of Fe_2A Laves phase compounds was measured in order to investigate its mutual correlation with their magnetic properties. In the ferromagnetic or antiferromagnetic Fe_2A compounds (A=Sc, Y, Ti, Zr, Hf, and U), a linear relation between the magnetic resistivity at temperatures above the Curie or Néel point and the localized magnetic moment was found, which means that the magnetic resistivity of these compounds is governed by the magnitude of magnetic moments. The electrical resistivity in the Pauli-paramagnetic $Fe_{2+x}Nb_{1-x}$ and $Fe_{2+x}Ta_{1-x}$ compounds with $x\approx 0$ shows a fairly large temperature variation, which seems to be due to the paramagnon scattering, whereas ρ-T curves in the iron-rich compounds suggest that the appearance of ferromagnetism is caused by the existence of the excess iron atoms occupying the wrong atomic sites.

A Study of Fermi Surfaces of the α-Phase Cu-Ge and Cu-Si Alloys by Positron Annihilation

Toshiharu SUZUKI, Masayuki HASEGAWA and Makoto HIRABAYASHI

Appl. Phys., **5** (1974), 269.

Angular correlation measurements on the fcc solid solutions of Cu-Ge and