The Fermi Surfaces of Cu-Pd Alloys Studied by Positron Annihilation(Physics)

Long-Range and Short-Range Order in Interstitial Compounds M_2X with Special Reference to V_2C and Nb_2C

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The existence conditions of the crystal structures of five Hägg compounds, V_2C, Nb_2C, Ta_2C, Co_2C and V_2N, are determined in the pair-wise interaction model regarding *interstitial atom rows* parallel to the *c* axis of hcp metal lattice. Short-range order diffuse scattering is studied by electron diffraction on V_2C and Nb_2C quenched from high temperatures, and discussed in comparison with calculations based on this model.

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The Fermi surfaces of Cu-Pd alloys below 63% Pd are studied by means of the angular correlation of positron annihilation with crossed-and long-slit geometries. The (001)- and (110)-radii decrease with increasing palladium content up to 30% in agreement with a calculation based on the rigid band model. The (111) neck radius also decreases with increasing composition, and it is suggested that the Fermi surface detaches from the hexagonal face of the Brillouin zone around 20% Pd, but remains to bulge in this direction at higher compositions. No detectable change is found in the correlation curves of the ordered and disordered states at 15 and 19% Pd. The origin of stabilization of the long period ordered structure near Cu_3Pd is discussed in the light of the present results.

Raman Scattering and Phase Transitions of V_2O_3

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Raman scattering in single crystals of V_2O_3 has been studied in the range from $\sim$ 20 K to room temperature. Metal to insulator, crystallographic, and anti-ferromagnetic-ordering transitions take place concurrently at $T_1 \sim 150$ K. The observed spectra showed a drastic change at T_1. On either side of T_1, peaks were observed which had intensities rather insensitive to the variation of temperature. These peaks are identifiable as phonon excitations, and the peaks of the two temperature regions can be correlated on the basis of the structural transition of the crystal. One peak was observed in the low-temperature region, the intensity of which decreased strongly with increasing temperature, becoming unobservable at $T \gtrsim T_1$. Clearly, this peak involved the excitation of magnons which resulted from the magnetic transition.