Partial Phase Diagram of Pd-Mn System Studied by Electron Diffraction and Microscopy

Rokuro Miida, Tokyo University of Science, Suwa, Chino Nagano, Japan. E-mail: miida@rs.suwa.tus.ac.jp

Among ordered phases reported in the present alloy system, four of Pd_3Mn (or Pd_3Mn II), Pd_2Mn , Pd_5Mn_3 and PdMn were confirmed to be stable, but no indications of Pd_3Mn I and $Pd_{21}Mn_{11}$ were obtained.

In the solid solution range from 25 to 50at%Mn, the crystal structure continuously transforms from D0₂₃ type to L1₀ type with increasing Mn content. The magnitude of c_0/a_0 of the basal lattice is 1.0 for 25.0-26.5at%Mn, and then decreases down to 0.91 at 36.1at%Mn. The Pd₃Mn phase is defined in the range from 25.0 to 26.5at%Mn, because $c_0/a_0=1.0$ in this range is the characteristic of D0₂₃ type structure. The electron micrograph shows the arrangement of minority atoms (Mn) in D0₂₃ type. For Mn content more than 37at%, the PdMn phase with L1₀ type is stable above 600°C. In the compositions between Pd₃Mn and PdMn phases, the occupation probability of Mn at each atom-site was expressed in terms of alloy composition.

The Pd₂Mn phase is stable below 700°C. The electron micrograph shows the arrangement of Mn atoms, which supports the structural model reported already [1]. The Pd₅Mn₃ phase was confirmed by electron diffraction patterns with different incidences. This phase is ranked as the second ordered structure of the PdMn phase. On the basis of ordered structures confirmed there, a partial phase diagram was proposed for Pd-rich Pd-Mn alloys.

[1] Kádár G., Krén E., Márton M., *J. Phys. Chem. Solids*, 1972, **33**, 212. **Keywords: electron diffraction, ordered structures, phase diagrams**