## X-ray Study of the Iridium-Osmium System

<u>Ilya Korolkov</u>, Sergey Gromilov, Kirill Yusenko, *Nikolaev Institute of Inorganic Chemistry SB RAS, Novosibirsk, Russia.* E-mail: x-vizor@yandex.ru

Os and Ir metals are of particular attention regarding their characteristics. For example, the osmium has the highest bulk moduli value of 462 GPa [1] among all other materials. Furthermore, Os and Ir possess the high values of density, melting temperature, etc. A phase diagram of Os-Ir system belongs to the peritectic type. Single-phase areas with the face-centered cubic (fcc) and hexagonal close packed (hcp) lattices are separated by a diphase area.

In some cases, it is possible to obtain a non-equilibrium solid solution that is placed into the diphase area. To get the single  $Ir_{0.5}Os_{0.5}$  phase we have thermolized a precursor complex  $[Ir(NH_3)_5Cl)][OsBr_6]$  at 700°C in hydrogen atmosphere. Finally, according to X-ray analysis data, a single phase with the hcp lattice was obtained. After further heating up to 800°C for 24 hours in vacuum the sample became diphase. The lattice parameters of the hcp phase are close to  $Ir_{0.5}Os_{0.5}$ . The lattice parameter of the fcc phase is close to the pure iridium.

Besides, we have obtained the  $Ir_{0.67}Os_{0.33}$  fcc phase from the  $[Ir(NH_3)_5Cl]_2[OsCl_6]Cl_2$  complex by prolonged heating; another phases  $Ir_{0.5}Os_{0.5}$  (hcp, non-equilibrium),  $Ir_{0.75}Os_{0.25}$  (fcc) and  $Ir_{0.25}Os_{0.75}$  (hcp) were synthesized by thermolysis of salt solid solutions  $(NH_4)_2[OsCl_6]_{(1-x)}[IrCl_6]_X$  ( $0 \le x \le 1$ ). For all of the phases we have calculated a "volume per atom" parameter. The calculated values fit a line that connects the values for pure iridium and osmium.

[1] Cynn H., Klepeis J. E., Yoo C. et. al., *J. Phys. Rev. Lett.*, 2002, **88**, 135701. Keywords: platinum group, thermal study, x-ray analysis