In framework of the experiment MI-513 (June, 2001) we developed an external heating assemblage (Fig.1) which allows conducting experiments in DAC at pressures above 130 GPa and temperatures above 1100 K. It consists of external resistive heaters placed around a cell, temperature resistant lever system, and a miniature DAC of a cylindrical shape (diameter 23 mm, height 15 mm) made out of a special high-temperature Ti-based alloy. The new system allows fine (within 1 GPa) adjustment of pressure in the whole temperature range, maintain constant pressure (within 1 GPa at megabar pressure range) and temperature (within 5 K at 1000 K) during several hours, measure temperatures accurately with an external thermocouple, and do not have measurable temperature gradient within the pressure chamber. The new heating assemblage is easily coupled with current experimental set up at ID30 and have been used in pilot experiments on Fe-Ni alloys (their behaviour up to 1 Mbar was studied), magnetite Fe_3O_4 (phase transformations and the thermal equation of state), wustite FeO (phase relations to 60 GPa), and H_2O (melting curve to 30 Gpa). However, upper working temperature limit of the assemblage depends on the ability of the metallic parts to sustain high temperatures. It means that we can not expect to increase the working temperature range above 1300 K. This limitation could be overcome in internally electrically heated systems.

Preliminary tests show that our internal heating system can be coupled with X-ray synchrotron radiation facilities (particularly at ID30). Unfortunately, a lack of time did not allow us to do this in a framework of the MI-513 experiment and we would like to request additional beam time.

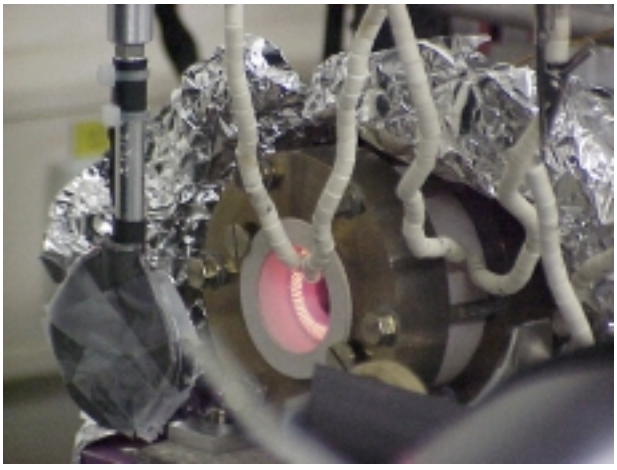

Fig. 1. High-pressure high-temperature assemblage on the stage at beamline ID 30 at ESRF. Temperature inside the cell is 1060(10) K, pressure is 87(2) GPa.