DENSITY AND MAGNETIC SUSCEPTIBILITY OF CoFeSiBNb ALLOY

Rusanov B.A.,* Sidorov V.E., Mikhailov V.A., Popel P.S.

USPU, Ekaterinburg, Russia

**rusfive@mail.ru*

Present paper has results of the density and magnetic susceptibility of the $Co_{48}Fe_{25}B_{19}Si_4Nb_4$ alloy. Compared with other compounds, this alloy shows a high ability to form bulk metallic glasses.

Alloy $Co_{48}Fe_{25}B_{19}Si_4Nb_4$ is melted from initial components in the Leybold-Heraeus IS01/III induction furnace. Rods with a diameter of 2 mm were obtained by suction casting into a copper water-cooled ingot.

The kinetics of crystallization of the alloy was studied using a differential scanning calorimeter NETZSCH at heating rates of 5, 10, 20 and 40°C/min. Density was measured by the absolute method of penetrating gamma radiation in the temperature range from 20 to 1550°C. The magnetic susceptibility was investigated by the relative version of the Faraday method in the temperature range from 800 to 1500°C. The experiments were carried out in an atmosphere of pure helium at a heating rate of 3°C/min. Used crucibles of beryllium oxide.

The temperature dependence of density of composition in the liquid state is close to linear. With a decrease in its temperature from the maximum, its precrystallization supercooling by almost 100°C was noted. The cooling curve in the solid state down to room temperature lies substantially above the heating curve.

There are two transformation points on the temperature dependences of the magnetic susceptibility. The first of these is not observed on the temperature dependences of the density and in calorimetric experiments and corresponds, apparently, to the polymorphic transformation, the second corresponds to the melting of the sample. In the liquid state, the temperature dependences of the magnetic susceptibility can be approximated by the generalized Curie-Weiss law. Based on the results obtained, the effective magnetic moment, the density of states at the Fermi level, and the paramagnetic Curie temperature are calculated.

The reported study was funded by RFBR according to the research project 18-03-00433.