Measurement of the Melting Temperature of Aluminum and Copper at Pressures up to 18000 kg/cm^2

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Until recently our information on the effect of superhigh pressure on the melting temperature of metals was limited to the data of Bridgman /1, 2/ who studied the melting of certain low-melting metals (potassium, sodium, lithium, rubidium and cesium, lead and gallium) at pressures up to 12000 kg/cm^2 and of bismuth at pressures up to 17000 kg/cm^2.

Since 1953 investigations of phase transformations of metals under conditions of superhigh pressure have been conducted in the Institute for Crystallography of the Academy of Sciences SSSR. The procedure worked out for obtaining and measuring a high temperature inside the channel of a high-pressure vessel has made it possible to widen the temperature interval in studies of the melting of metals under superhigh pressure /3/. Measurements have been made of the melting temperature of tin and lead up to a pressure of 34000 kg/cm^2 /4/, of antimony, cadmium, zinc, and tallium at a pressure up to 30000 kg/cm^2 /5/, and of bismuth up to a pressure of 30000 kg/cm^2 /6/. The measurements indicated were made with specimens of metals placed in a heated crucible in a medium of isopentane in the channel of the high-pressure multiplier. The melting temperatures of the metals enumerated above, with the exception of bismuth, gallium, and antimony, rise with an increase of pressure. In the case of bismuth and gallium the melting temperatures drop only to the ternary point: α-phase - β-phase - melt. In the case of antimony the reduction of the melting temperature was observed over the entire interval of pressures studied.

In 1955 were published measurements of the melting temperature of germanium