Fast (Microsecond) Heating of Dense Isotropic Graphite

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The results of fast electrical heating (microseconds) of graphite specimens placed in a water and in the thick-walled sapphire tubes are shown and discussed. Isotropic graphite MF-307 of high density (2.0 g/cm^3) was manufactured by Nippon Corporation. The initial resistivity was 1250 μΩ·cm. Heating in water gives the maximum input energy and equals ~ 10 kJ/g. Thereafter a sharp rising of the resistivity took place, that looks like a metal – non-metal transition [1]. The possible explanation is the sharp rising of the volume at a pressure lower than 100 bar, before the proposed melting point. In addition, we placed the specimen in a thick-walled sapphire tube to ensure high pressure when the specimen expands, and fill all inner volume of the tube. Electrical resistivity of the carbon was measured in an isochoric process of heating up to the input energy 32 kJ/g. We observed that the resistivity rose after the finish of melting at the input energy ~ 21 kJ/g. The resistivity (with expansion included) reached ~ 2000 μΩ·cm up to the highest input energy. The results are compared with the data of M.Togaya [2].

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