

Transport Properties of Bioceramics Type Bio-C/Cu (LT26)

A. Jezowski^a, J. Mucha^a, H. Misiolek^a, I.A. Smirnov^b, and L.S. Parfeneva^b

^aInstitute for Low Temperature and Structure Research , Polish Academy of Sciences, Wroclaw, Poland

^boffe Physical-Technical Institute, Russian Academy of Sciences, St. Petersburg, Russia

Thermal conductivity, κ , and electrical resistivity, ρ , of pine biocarbon preform/composites (bio-C/Cu) have been measured and studied in the temperature range 4 K – 300 K. Biocarbon preforms have been prepared by pyrolysis of wood in argon flow at two carbonization temperatures 1000 C and 2400 C . Then the sap channels as well as radial channels of the wood have been filled with pure copper . The magnitude of the thermal conductivity of the copper embedded in the preforms has been separated out of the total measured composite thermal conductivity value κ and has occurred to be considerably lower than that of the bulk copper. This result is attributed to the structure of copper in the composite, namely to breaks in the copper fillings. The microstructure of the preform also influences the dependence on the temperature of total ρ of the composites. The resistivity is primarily governed by the specific microstructure of the preform. Parallel channels of an average diameter of about 50 μm separated by systems of thin capillaries occur here to be most important. Copper-filled capillaries of small cross section contribute most to the electrical resistivity of the composites.