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Superconductivity and Phase Diagram in the Nanostructured Eutectic Ga–Ag Alloy

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Received: April 22, 2022

Revised: April 22, 2022

Accepted: April 25, 2022

Here, we present a study of superconductivity in the Ga–Ag alloy embedded into porous template with pore diameter of 10 nm. The composition was close to the eutectic point in the gallium-rich range. We measured DC and AC magnetizations for temperatures from 1.8 to 10 K and magnetic fields up to 6 T. Three superconducting transitions were found at temperatures 7.05, 6.08, and 2.65 K in contrast to the bulk counterpart. Upper critical field lines were obtained. Activation barriers were evaluated from the AC data. The temperatures of the superconducting transitions were ascribed to emergence of β - and t -Ga and of an intermetallic different from bulk Ag_3Ga_2 .

Keywords: nanostructured Ga–Ag eutectic alloy, superconducting transitions, segregated phases, DC and AC susceptibility.