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PERCOLATION TRANSITIONS IN Bi2Sr2Ca2Cu3O6+x/La0.7Sr0.3MnO3RANDOM NANOCOMPOSITE

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Abstract

We have studied transport characteristics of random binary networks composed of d-wave superconductor Bi2Sr2Ca2Cu3O6+xmicroparticles and half-metallic ferromagnet La0.7Sr0.3MnO3 (LSMO) nanoparticles. Double resistive percolation transition (superconductor–metal–semiconductor) for nanocomposites with the LSMO volume fraction below 30% was observed. We argue that the constituent particle geometrical size and indirect interaction via superconducting proximity effect play a crucial role in realizing necessary conditions enabling the percolation transitions in the nanocomposites under consideration.

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