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Polaron superconductivity model for Li-doped nanotube-zeolite composite XIANXIANG HUANG, PING SHENG, Department of Physics and Institute of Nano Science and Technology, The Hong Kong University of Science and Technology — We propose a polaron superconductivity model for Li-doped nanotube-zeolite composite, in which the 4 Angstrom carbon nanotubes are embedded in the zeolite matrix, with a nanotube-nanotube wall separation of less than 10 Angstroms. The small separation implies inevitable nanotube-nanotube coupling, leading to a 3D anisotropic superconductor. Here we calculate the mean-field superconducting transition temperature based on the fact that each adsorbed Li atom, situated in the middle of the nanotube, donates an electron to the nanotube so as to form an ion-electron system. In addition, the Li ion is trapped in a shallow well formed by the (5,0) nanotube, with a periodicity of 4.3 Angstroms. So the Li vibration resembles that of an optical phonon. We have evaluated both the electron-electron interaction and the electron-phonon interactions in the presence of the screening effect, and solved the Eliashberg-Gorkov equation to obtain the superconducting transition temperature.

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