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Ce doping in T-La2CuO4 films: Broken electron-hole symmetry in high-Tc superconductivity AKIO TSUKADA, HIDEKI YAMAMOTO, NTT Basic Research Laboratories, MICHIO NAITO, Tokyo University of Agriculture and Technology — We attempted Ce doping in La_2CuO_4 with the K_2NiF_4 (T) structure by molecular beam epitaxy. With low growth temperature and appropriate substrate choice, we found that Ce can be incorporated into the K_2NiF_4 lattice up to $x \sim 0.06$, which has not yet been realized in bulk synthesis. The doping of Ce made T-$La_{2-x}Ce_xCuO_4$ more insulating, which is in sharp contrast to Ce doping in La_2CuO_4 with the Nd_2CuO_4 structure, which made the compounds superconducting. The observed smooth increase in resistivity from hole-doped side (T-$La_{2-x}Sr_xCuO_4$) to electron-doped side (T-$La_{2-x}Ce_xCuO_4$) indicates that electron-hole symmetry is broken in the T-phase materials. We propose that the nature of the insulating state in T-$La_{2-x}Ce_xCuO_4$ is of a Kondo insulator instead of a Mott insulator. The insulating mechanism based on Kondo interaction between Cu3d spins and O2p holes explains the global evolution of the resistivity and also the pseudo gap phenomenon from hole-doping to electron doping.

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