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Disorder-enhanced superconductivity in Li intercalated ZrNCl

YUJI NAKAGAWA, YU SAITO, The University of Tokyo, WU SHI, University of California at Berkeley, YUICHI KASAHARA, Kyoto University, YOSHIHIRO IWASA, The University of Tokyo — Electrolyte gating, as represented by electric-double-layer transistor (EDLT), possesses various functionalities; forming of $p - n$ junction, electrostatic control of phase transitions, electrochemical etching and intercalation. These different functions, namely, electrostatic function or electrochemical function, strongly depends on the geometry of the device and the temperature in which a gate voltage is applied, and are considerably useful to unveil hidden intrinsic properties of a system. In this talk, we report a study on the transport properties in Li intercalated ZrNCl, which exhibits a maximum transition temperature of 15.2 K in lightly doped regime near the superconductor-insulator transition point. By the application of gate voltages in an EDLT configuration, we succeeded in *in-situ* resistance measurement in the electrochemical intercalation process, and thereby superconductivity in a single crystal. We found that superconductivity in Li intercalated ZrNCl changed from 2D to anisotropic 3D. Furthermore, enhancement of T_c in the lightly doped regime is accompanied by the increase of disorder and superconducting fluctuation. These results suggest that superconductivity of ZrNCl in the lightly doped regime is enhanced by disorder.

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