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**Possible coexistence of  $s$ -wave and unconventional pairing in hydrated  $\text{Na}_x\text{CoO}_2$ : a new insight from impurity effects**<sup>1</sup> JIUNN-YUAN LIN, Y.-J. CHEN, Institute of Physics, National Chiao Tung University, Hsinchu 300, Taiwan, C.-J. LIU, J.-S. WANG, Department of Physics, National Changhua University of Education, Changhua 50007, Taiwan, C. P. SUN, H. D. YANG, Department of Physics, National Sun Yat Sen University, Kaohsiung 804, Taiwan, S. W. HUANG, Department of Electrophysics, National Chiao Tung University, Hsinchu 300, Taiwan, J. M. CHEN, J. M. LEE, J. F. LEE, D. G. LIU, National Synchrotron Radiation Research Center, Hsinchu 300, Taiwan — Impurity effects on  $T_c$  were known to provide indispensable information in many novel superconductors. To shed light on the symmetry of the superconducting order parameter in hydrated  $\text{Na}_x\text{CoO}_2$ , the Mn doping effects have been studied. X-ray absorption spectroscopy reveals that the doped Mn impurities occupy the Co sites and have a valance close to 4+. Impurity scattering by Mn is in the unitary limit that, however, does not lead to strong  $T_c$  suppression. This absence of the strong impurity effects on  $T_c$  is not consistent with the simple picture of a sign-changing order parameter. For reconciliation among all existing experiments, the model of coexistence of  $s$ -wave and unconventional pairing is proposed.

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