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Temperature dependence of DOS at the surface of Na0.75CoO2
LEI CAI, CHENXI LU, JIANDI ZHANG, Florida International University(FIU), Miami, FL 33199, R. JIN, B. C. SALES, D. G. MANDRUS, ORNL, Oak Ridge, TN 37831 — Although many interesting bulk phenomena of layered compound Na_xCoO_2 are unveiled, the lack attention is paid to the surface properties. The structure and the composition in the proximity of the surface can make the surface properties to be drastically different from the bulk in spite of its quasi-2D layered character. We have studied the density of states (DOS) as a function of the temperature for in-situ cleaved Na_xCoO_2 with x $\sim$ 0.75 by Variable Temperature Scanning Tunneling Microscopy (VT-STM). While it shows strong temperature dependence, the dI/dV curve indicates the presence of a finite DOS at the Fermi level (E_F) at all measured temperatures between 91 K to 294 K. This is consistent with previous report that $Na_{0.75}CoO_2$ is metallic in bulk. However, an unusual shift of the minimum DOS occurs below 230 K. Combining with the observation of a hump on the curve of DOS *vs.* T at the energy levels between 0.11 eV and 0.51 eV, we attribute the shift to the local charging effect on the surface which indicates an unconventional metal-insulator transition near 230 K. The work was supported by NSF-DMR0346826 and DOE DE-FG02-04ER46125. ORNL is managed by UT-Battelle, LLC, for the U.S. Dept. of Energy under contract DE-AC05-00OR22725

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