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Atomically resolved images and spectroscopy of superconducting $Ba(Fe_{1-x}Co_x)_2As_2$ single crystals N.-C. YEH, M.L. TEAGUE, Dept. of Physics, Caltech, Pasadena, CA 91125, P. CHENG, H.H. WEN, Inst. of Physics, Chinese Academy of Sciences, CHINA — We report atomically resolved images and spectroscopy of electron-doped superconducting $Ba(Fe_{1-x}Co_x)_2As_2$ single crystals, with x = 0.12, 0.08 and 0.06 corresponding to T_c = 20 K, 24 K and 14 K, respectively. Scanning tunneling microscopic images of the crystals reveal somewhat disordered atomic arrangements of the Ba, As and Fe/Co layers, with averaged lattice constant $\sim$ 0.40 nm for Ba and As layers, and $\sim$ 0.28 nm for the Fe/Co layers. In contrast, spectroscopic studies indicate relatively homogeneous tunneling conductance at constant bias voltages, which differ from the findings on hole-doped $(Ba_{1-x}K_x)Fe_2As_2$. Two types of spectra are observed, corresponding to two energy gaps $\sim$ 5 meV and $\sim$ 10 meV for $Ba(Fe_{0.88}Co_{0.12})_2As_2$, and the spatial distribution of the larger gap exhibits quasi super-modulations. The smaller gap may be attributed to superconductivity and the larger gap may be related to remnant spin density waves. Finally, doping dependent spectral evolution of $Ba(Fe_{1-x}Co_x)_2As_2$ will be discussed.
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