

Electronic inhomogeneity and zero-bias conductance peaks on optimally doped $\text{NdBa}_2\text{Cu}_3\text{O}_{7-\delta}$: a -axis tunneling spectroscopic studies

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We report the results of scanning tunneling spectroscopic experiments performed on optimally doped $\text{NdBa}_2\text{Cu}_3\text{O}_{7-\delta}$ single crystals ($T_c=95.5$ K) at $T = 4.2$ K. The data show that the (bc) -plane is electronically inhomogeneous. Typical d-wave superconducting gaps having V-shaped intra-gap structures have been observed on the surface. We report on the observation of zero-bias conductance peaks at certain tunneling locations. We analyzed the data using the generalized formulation of the BTK tunneling theory for normal metal-insulator- d -wave superconductors [1] and show that the peak at the zero bias conductance is produced due to the atomic-scale roughness existing on the surface.

[1] Tanaka *et al.*, PRL **74**, 3451 (1995)