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Energy gap and asymmetry of coherence peaks in 123 cuprate superconductors and their T_c dependence — •Pintu Das[1,3], Michael R. Koblischka[1], Thomas Wolf[2], and Uwe Hartmann[1] — [1]Institute of Experimental Physics, University of Saarland, 66041, Saarbruecken, Germany — [2]Forschungzentrum Karlsruhe GmbH, Institute of Solid State Physics, 76021 Karlsruhe, Germany — [3]Max Planck Institute of Chemical Physics of Solids, Nöthnitzer Str. 40, 01187 Dresden, Germany

The energy gap in conventional superconductors is directly proportional to the transition temperature. In high-T_c cuprate superconductors, scanning tunneling spectroscopy (STS) and angle resolved photoemission studies have often shown that the underdoped samples which have low T_c values exhibit very large energy gaps giving rise to a high value of the coupling ratio ($2\Delta/k_BT_c$). This has been mostly observed for $Bi_2Sr_2CaCu_2O_{8+\delta}$. In this work, we observe from the STS experiments on $NdBa_2Cu_3O_{7-\delta}$ single crystal samples that the average energy gap increases with the decrease of T_c. For a moderately underdoped sample the coupling ratio is found to be as high as 18. We also observed an asymmetry in coherence peaks which is minimum in the case of optimally doped (highest T_c) samples. The observed T_c dependence of the asymmetry suggests that it is related to the number of electrons and holes.

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