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Tunneling Spectroscopy on c-axis $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ Thin Films: Evidence for Multiband Superconductivity[1] J.H. NGAI, University of Toronto, W.A. ATKINSON, Trent University, J.Y.T. WEI, University of Toronto
— We report scanning tunneling spectroscopy measurements on {001} oriented $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ thin films at x= 0, 0.05, 0.15 and 0.20 Ca-doping at 4.2K. The tunneling spectra exhibit main-gap, sub-gap and satellite features which we analyze using a generic multiband tunneling model that accounts for the separate contributions of the plane and chain bands to the tunneling conductance spectrum. Our analysis indicates the sub-gap features could arise from the chain band density of states, while the satellite features could come from the plane band for a $d_{x^2-y^2}+s$ pairing symmetry. The doping dependent evolution indicates that all three spectral features are set by a single parameter Δ_0, which monotonically decreases with Ca-doping, suggesting that superconductivity in $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ involves multiple bands.

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