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Scanninng Josephson Tunneling Microscopy of Single Crystal $Bi_2Sr_2CaCu_2O_{8+\delta}$ from a Conventional Superconducting Tip HIKARI KIMURA, University of California, Berkeley, RICHARD BARBER, Santa Clara University, SHIMPEI ONO, CRIEPI, YOICHI ANDO, Osaka University, ROBERT DYNES, University of California, Berkeley and LBNL — Using a scanning tunneling microscope with superconducting Pb-coated tips (S-STM), we have observed the thermally fluctuated Josephson Effect between the tip and conventional superconductors. Such STM-based Josephson junctions are a powerful tool that can directly probe the phase of the superconducting condensate via the Josephson Effect as well as characterize the quasiparticle spectrum, both on a nanometer length scale. In this talk we present data from Josephson junctions formed between the S-STM tips and $Bi_2Sr_2CaCu_2O_{8+\delta}$ single crystals. These results clearly show c-axis Josephson tunneling between a conventional superconductor and both overdoped and optimally doped $Bi_2Sr_2CaCu_2O_{8+\delta}$. Josephson measurements at various surface locations indicate an inhomogeneous structure of the I_CR_N product in overdoped $Bi_2Sr_2CaCu_2O_{8+\delta}$. These local I_CR_N data of the $Bi_2Sr_2CaCu_2O_{8+\delta}$ are related to the local superconducting gap. This work is supported by DOE Grant No. DE-FG02-05ER46194.

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