Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Proximity Effect in Gold-Coated $YBa_2Cu_3O_{7-\delta}$ Films Studied by Scanning Tunneling Spectroscopy AMOS SHARONI[1], ITAY ASULIN, ODED MILLO, OFER YULLI, Racah Institute of Physics, The Hebrew University, Jerusalem 91904, Israel, GAD KOREN, Department of Physics, Israel Institute of Technology, Haifa 32000, Israel — Scanning tunneling microscopy and spectroscopy measurements were performed on proximity systems of the high temperature superconductor $YBa_2Cu_3O_{7-\delta}$ (YBCO) covered by a normal gold layer of various thicknesses. Tunneling spectroscopy of gold layers overcoating c-axis YBCO films reveals proximity-induced gap structures. The gap size reduces exponentially with the distance from a-axis facets, indicating that the proximity effect is primarily due to the (100) YBCO facets. The normal penetration depth, ξ_n, is in agreement with estimations for a dirty limit proximity system[1]. The proximity effect changes considerably for (110)YBCO/Au bilayers. While proximity-induced mini-gaps rarely appear in the Au layer, the Andreev bound states, clearly penetrate into the metal. Zero bias conductance peaks are measured on Au layers thinner than 7 nm with a magnitude similar to those detected on the bare superconductor films. The peaks then decay abruptly with Au thickness and disappear above 10 nm. This length is shorter than the normal coherence length and corresponds to the (ballistic) mean free path[2]. [1]Sharoni A. *et al.* Phys. Rev. Lett. **92** 017003 (2004). [2]Asulin I. *et al.* Phys. Rev. Lett. **93**, 157001 (2004).

[1]currently at UC San Diego

Amos Sharoni
Racah Institute of Physics, The Hebrew University, Jerusalem 91904, Israel

Date submitted: 22 Nov 2004 Electronic form version 1.4