Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Electrical Transport in Encapsulated Few Atomic Layer Bi2Sr2CaCu2O(8+x) SHU YANG FRANK ZHAO, MARGARET G. PANETTA, CYNDIA YU, NICOLA POCCIA, Department of Physics, Harvard University, RUIDAN ZHONG, GENDA GU, Brookhaven National Laboratory, TAKASHI TANIGUCHI, KENJI WATANABE, National Institute for Materials Science, PHILIP KIM, Department of Physics, Harvard University — We investigate electronic transport in few atomic layer high temperature superconductor $Bi_2Sr_2CaCu_2O_{8+x}$ (BSCCO), obtained via mechanical exfoliation of optimally doped single crystals. In order to avoid sample surface degradation during lithography, we fabricate electrical contacts using a silicon nitride stencil mask, aligned to the sample inside an argon environment with an integrated evaporator. After fabrication, an exfoliated, insulating hexagonal boron nitride crystal is placed on top of the device, sealing it from the environment. In thicker samples containing more than nine copper oxide planes, we observe bulk-like behavior: a linear decrease in normal-state resistance followed by a sharp superconducting transition, with a transition temperature consistent with bulk optimally doped BSCCO. We will also discuss anomalies of resistance versus temperature observed in thinner samples, where a slightly broadened superconducting transition at 85K is followed by an anomaly in resistance, before falling back to zero resistance.

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Date submitted: 11 Nov 2016 Electronic form version 1.4