Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Dimensional evolution of the electronic and structural properties of K_xC_{60} multilayers studied by Scanning Tunneling Microscopy YAYU WANG, RYAN YAMACHIKA, ANDRE WACHOWIAK, MIKE GROBIS, MIKE CROMMIE, Department of Physics, University of California at Berkeley — We investigate the effect of dimensionality on the properties of potassium doped C_{60} (K_xC_{60}) by studying thin films with precisely controlled doping levels and layer structures using scanning tunneling microscopy and spectroscopy. We observe systematic variation in spatial and electronic structure as the films change from the 2D to the quasi-3D regime. In metallic K_3C_{60}, the large electronic density of states at the Fermi level (E_F) is seen to split, with a small gap opening at E_F. In the Jahn-Teller-induced K_4C_{60} insulator, the energy gap around E_F increases monotonically with increased film thickness. In K_5C_{60}, the spectra change from a re-entrant metal in the first layer to an insulator in the third layer. These trends can be explained by considering the increase of Coulomb repulsion in multilayers as screening from the metal substrate is reduced. These results highlight the role of strong electron correlation and dimensionality in determining the properties of doped fullerides.

Yayu Wang
Department of Physics, University of California at Berkeley

Date submitted: 20 Nov 2006 Electronic form version 1.4