

Abstract Submitted
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Electronic Structure Investigation of Doping C₆₀ with Metal Oxide¹ CHENGGONG WANG, YONGLI GAO, Department of Physics and Astronomy, University of Rochester — Fullerene (C₆₀) has been used extensively as an acceptor material in organic photovoltaic (OPV) cells. Other applications including n-channel organic thin film transistors (OTFT) and C₆₀ based organic superconductors have been reported more than a decade ago. We have investigated p-doping of C₆₀ with molybdenum oxide (MoO_x) with ultra-violet photoemission spectroscopy (UPS), inverse photoemission spectroscopy (IPES) and atomic force microscopy (AFM). Both surface doping and bulk doping by MoO_x are studied. It was found that the thermally evaporated MoO_x inter-layer substantially increased the surface workfunction. This increased surface workfunction strongly attract electrons towards the MoO_x layer at the C₆₀/MoO_x interface, resulting in strong inversion of C₆₀. Energy levels of C₆₀ relax gradually as the thickness of C₆₀ increases. An exceptionally long (greater than 400 Angstrom) band bending is observed during this relaxation in C₆₀. Such a long band bending has not been observed for other organic/MoO_x interface. For the bulk doping, MoO_x doping ratios from 1% to over 100% were investigated. The saturation occurs at approximately 20 %, when the highest occupied molecular level (HOMO) of C₆₀ starts to be pinned at the Fermi level. These studies demonstrate effective ways to manipulate the electronic structures of the fullerene.

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