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Novel orientational ordering in a K-doped C_{60} monolayer RYAN YAMACHIKA, YAYU WANG, ANDRE WACHOWIAK, MICHAEL GROBIS, DUNG-HAI LEE, AMY KHOO, STEVEN LOUIE, MICHAEL CROMMIE, Department of Physics, University of California, Berkeley, Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA — Orientational ordering, which originates from broken rotational symmetry, is a central feature of a broad range of materials including liquid crystals, quantum magnets, and some biological systems. By doping C_{60} monolayers with alkali impurities, the symmetry of C_{60} molecules can be broken, opening up the possibility for unique two-dimensional molecular orientational ordering. Here we present a scanning tunneling microscopy/spectroscopy study of K_xC_{60} monolayers on Au(111), $x \geq 4$. We find novel orientational orderings in the C_{60} monolayers at different doping levels, which coincide with strong variations in the monolayer local density of states. This demonstrates the importance of the interplay between Coulomb repulsion, electron-phonon coupling, electronic quadrupolar interactions, and direct orbital overlap in determining the behavior of fullerene nanostructures.

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