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Measuring Electronic Properties of Topological Defects in Molecular Graphene CHARLIE CAMP, DOMINIK RASTAWICKI, KENJIRO GOMES, WONHEE KO, WARREN MAR, MING RUE THIAN, FRANCIS NIESTEMSKI, ALEX CONTRYMAN, CAROLINA GONZALEZ, HARI MANOHARAN, Stanford University — With the development of artificial “molecular” graphene, it is possible to create a two-dimensional electron system very similar to graphene by assembling molecules in the appropriate geometry on surface states using a scanning tunneling microscope (STM) tip. Using this same system, we recreate many lattice defects that occur naturally in graphene. Such defects have a significant effect on the electronic and transport properties of natural graphene, and are thus of notable interest in the development of nanoelectronics. In particular, we study rotational grain boundaries, which are formed by the rotation of a region of graphene with respect to the rest of the lattice. These include the Stone-Wales defect, the simplest with two adjacent carbon sites rotated by 90 degrees, as well as a common larger topological defect recently identified as the flower defect. Using STM, we examine the electronic properties of these defects in molecular graphene, paying particular attention to the emergence of new states close to the Dirac point and the quasiparticle scattering. These geometries are also studied in hole- and electron-doped variants.

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