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**Spectroscopy and Structure of Diamondoid-Fullerene Hybrid Molecules at the Single-Molecule Level**<sup>1</sup> JASON C. RANDEL, GEORGES NDABASHIMIYE, HARI C. MANOHARAN, Stanford University — Diamondoids—a nanometer-scale form of carbon sharing the  $sp^3$  bonding structure of bulk diamond—are promising new electronic and mechanical device elements and have recently become accessible to experiments. While new fields of research have also sprouted from carbon's  $sp^2$  forms (such as graphene, fullerenes, and carbon nanotubes), materials representing the intersection of  $sp^2$  and  $sp^3$  bonding structures are an exciting new arena for nanoscale science and technology. In this study, we investigate hybrid molecules fusing  $sp^2$  and  $sp^3$  allotropes of carbon (in the form of C<sub>60</sub> fullerenes and molecular diamondoids, respectively) into one well-defined system. We use low-temperature scanning tunneling microscopy to characterize monolayers and single molecules with sub-molecular resolution. We show the degree to which the electronic properties of the hybrid molecules differ from their single-allotrope components, and highlight the intriguing electronic features that emerge which have no analog in either of the separate molecular constituents.

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