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Single Molecule Characterization of Conjugated Oligomers Formed through Radical Cyclization at a Surface HSIN-ZON TSAI, ALEXANDER RISS, UC Berkeley physics, SEBASTIAN WICKENBURG, LIANG TAN, UC Berkeley physics/ LBNL, PATRICK GORMAN, UC Berkeley chemistry, DIMAS OTEYZA, CSIC/UPV-EHUMaterials, San Sebastian, YEN-CHIA CHEN, UC Berkeley physics/ LBNL, AARON BRADLEY, MIGUEL UGEDA, UC Berkeley physics, GRISHA ETKIN, UC Berkeley chemistry, STEVEN LOUIE, UC Berkeley physics/ LBNL MSD, FELIX FISCHER, UC Berkeley chemistry/ LBNL MSD, MICHAEL CROMMIE, UC Berkeley physics/ LBNL MSD — Conjugated polymers have gained considerable attention due to their potential industrial applications and interesting fundamental properties. Real-space imaging their chemical bonds and understanding their electronic structures at the nanoscale could lead to enhanced control in the synthesis of these polymers for the potential applications in the nanoelectronics. Here, we present the synthesis and characterization of poly-acetylene derivatives resulting from cyclizations of enediyne molecules on an Au(111) surface. We performed non-contact atomic force microscopy (nc-AFM) with sub-molecular resolution to determine the precise chemical structure of cyclized monomers and chemically linked molecular chains. Additionally, STM measurements provide insight into the corresponding electronic structure and reveal a 1D conducting channel along the backbone of the conjugated oligomers, consistent with theoretical predictions. This work demonstrates the unique insight that can be gained by combining nc-AFM and STM to study the chemical and electronic structure of molecular assemblies at surfaces.

Hsin-Zon Tsai
UC Berkeley physics

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