Abstract Submitted
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Mesoscopic Aligned and Cu-Coordinated Surface Linear Polymerization at Low Temperature[1] QING LI, Oak Ridge National Lab, JONATHAN R. OWENS, Rensselaer Polytechnic Institute, CHENGBO HAN, North Carolina State University, MIGUEL FUENTES-CABRERA, BOBBY G. SUMPTER, Oak Ridge National Lab, WENCHANG LU, JERRY BERNHOLC, North Carolina State University, PETRO MAKSYMOVYCH, Oak Ridge National Lab, VINCENT MEUNIER, Rensselaer Polytechnic Institute, MINGHU PAN, Oak Ridge National Lab — The on-surface synthesis of covalent organic aggregates and networks has received considerable attention. However, most of the polymerization reactions require high temperatures to overcome the activation barrier. We demonstrate a surface-coordinated linear polymerization, which occurred at 100 K and forms long chain that are well-organized into a "circuit-board" pattern on Cu(100) surface. This highly strained 1D conjugated polymer alters greatly the electronic structure compared to unperturbed polymer and it was investigated by electronic and vibrational spectroscopies, as well as *ab initio* calculations. More importantly, the processes of polymerization and depolymerization can be controlled locally at the nanoscale by a using a charged metal tip. This work thus demonstrates the feasibility of accessing and controlling chain-growth polymerization at low temperature that may lead to the bottom-up construction of sophisticated architectures for molecular nano-devices.

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Qing Li
Oak Ridge National Lab

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