Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Synthesis of Biomimetic Branched Polymer Architectures AMANDA MARCIEL, DANIELLE MAI, CHARLES SCHROEDER, University of Illinois at Urbana-Champaign — Development of sequence-defined or structurally-precise polymers as high-performance materials is a major challenge in materials science. In this work, we report a facile synthesis platform to produce monodisperse and stereochemically precise nucleotidomimetic polymers. Based on a top-down approach, we are able to precisely incorporate a wide-variety of functional group modifications in a simple two-step process. First, we utilize the natural ability of DNA polymerase to enzymatically incorporate chemically-modified monomers (e.g., C5-dibenzocyclooctyl dUTP) in a template-directed fashion. Second, we employ copper-free click chemistry to integrate the desired chemical functionality at precise locations along the polymer chain. In this way, we produced a variety of branched DNA homopolymer architectures including 3-arm star, symmetric H, and block-brush. Overall, this synthetic strategy allows for the systematic variation of oligomer length, stoichiometry, concentration, and environmental conditions to rapidly explore nucleotidomimetic polymer phase behavior for materials discovery.

Amanda Marciel
University of Illinois at Urbana-Champaign

Date submitted: 15 Nov 2013 Electronic form version 1.4