Abstract Submitted
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Template-directed synthesis of structurally-defined branched polymer architectures AMANDA MARCIEL, UIUC — In this work, we describe a hybrid synthetic strategy to produce structurally-defined branched polymer architectures based on chemically-modified DNA. Overall, this approach enables precise control over branch placement, grafting density, and chemical identity of side branches. We utilize a two-step scheme based on polymerase chain reaction (PCR) for site-specific incorporation of non-natural nucleotides, followed by copper-free click chemistry for grafting side branches at specific locations along the main polymer backbone. Linear DNA backbones are first synthesized via PCR utilizing the promiscuity of a high yield thermophilic DNA polymerase to incorporate nucleotides containing bioorthogonal dibenzocyclooctyne functional groups at precise locations along one strand of a double stranded DNA backbone. Following PCR, copper-free click chemistry is used to attach synthetic polymer branches or oligonucleotide branches to the DNA backbone, thereby allowing for the design and synthesis of a variety of precise polymer architectures, including three-arm stars, H-polymers, and graft block copolymers.

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