

# **DNA-Templated Dimerizations of Minor Groove-Binding Polyamides**

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*...for Katherine, my love...*

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## Abstract

Polyamides have emerged as a class of small molecules capable of binding the minor groove of DNA with high affinity and sequence specificity that have potential applications in molecular biology and human medicine. In efforts towards the use of polyamides in living cells, we report research directed towards DNA-templated formations of polyamide dimers. We find that formation of polyamide dimers, linked both turn-to-turn and turn-to-tail, can be templated via a 1,3-dipolar cycloaddition using a targeted sequence of DNA. The dimer products formed *in situ* may prove to have interesting biological effects.

Also reported in this thesis are several uses of polyamides as molecular tools. We find that polyamide-biotin conjugates are able to selectively bind and capture targeted pieces of DNA via streptavidin-coated magnetic beads, effectively enriching mixtures of DNA fragments in the fragment of interest. Such molecules may find utility in the identification of DNA-protein complexes. In a second utility we report the use of polyamide-maleimide and chlorambucil conjugates to impart sequence specificity on nonspecific DNA enzymes for crystallographic studies.

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