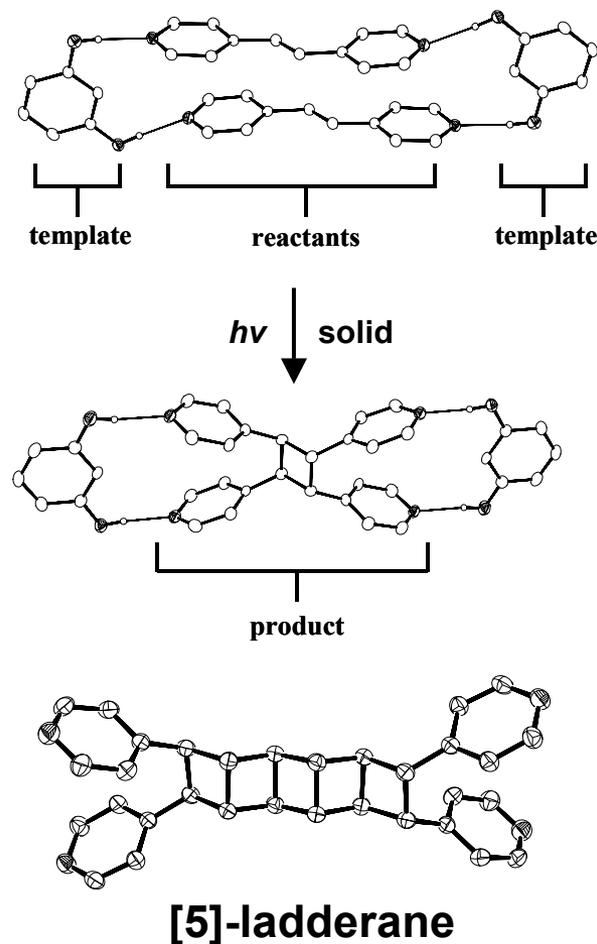


Template-Controlled Solid-State Synthesis of Molecular Ladders

Leonard R. MacGillivray, University of Iowa, DMR-0133138

Scientific Merit: A general ability to direct the formation of carbon-carbon bonds in the solid state bears relevance in chemical synthesis (*e.g.* green chemistry) and materials science (*e.g.* optical switches). We are developing such a method (top right) that employs molecules, in the form of linear templates, that preorganize olefins in the solid state for [2+2] photodimerization. We have recently used our method to form molecular ladders (bottom right), challenging targets in conventional synthesis and molecules recently identified in anaerobic bacteria that participate in the oceanic nitrogen cycle, in 100% yield and gram quantities (*Angew. Chem.*, in press).



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Relevance, Education and

Outreach: By being targets of templates in the solid state, molecular ladders have allowed us to bridge a gap between conventional synthesis, supramolecular chemistry, and biology. Two undergraduate and two graduate students, as well as one postdoctoral fellow contributed to the work. A sophomore lab in organic chemistry has also been developed and has introduced approximately 200 undergraduates to the template-based solid-state approach.

