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Proteins and other Foldameric Materials

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We have been interested in the principles that drive proteins to fold up into their unique biologically functional native structures. We have explored folding codes — how different types of monomer units could encode an ability to fold into a specific structure; folding kinetics — how quickly such chains can fold; and computer predictions of foldamer structures from their monomer sequences. As tests, we have explored a type of polymers, called peptoids, which bear some resemblance to peptides, but have nonbiological backbones. We find that we can design such molecules to fold into helices and helical bundles, and are exploring their structures and properties. The long-term goal is new materials that could perform bio-like functions.