New synthetic self-assembling macromolecules mimic nature

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We take "self-assembly" for granted when it is carried out by the biopolymers which are our hair, teeth, or skin. But when scientists devise new ways for molecules to self assemble into new materials, it is an important achievement.

Researchers with the Macromolecules and Interfaces Institute at Virginia Tech report such a development in the online issue for the *Journal of the American Chemical Society*, in the article, "Aggregation of Rod-Coil Block Copolymers Containing Rigid Polyampholyte Blocks in Aqueous Solution" (10.1021/ja070422+) and at the 233rd National Meeting of the American Chemical Society (ACS) in Chicago, March 25-29.

S. Richard Turner, MII director and research professor of chemistry at Virginia Tech, and Min Mao, a Ph.D. candidate in polymer chemistry, report the synthesis of a new family of charged, rod-like block copolymers. Only as long as a fraction of the diameter of human hair, the tiny rods can be either positive or negative, or can have alternating positive and negative charges along the backbone. The rods self-assemble and the aggregated structures are remarkable stable in saline solution, Turner said.

"The early results of this study suggest that these charged polymers self-assemble by like-charge interactions similar to such natural polymers as DNA," said Turner. "The stable self-assembled structures could have potential applications in drug delivery and gene delivery systems."

But more immediate, "These unique block copolymers can be instructive models in understanding the forces that lead to the dense packing of DNA when complexed with viruses and other polymers," he said.

Source: Virginia Tech