Analytical Instrumentation, Methods & Materials

Methods of Manufacturing and Using Beta-Peptide Lyotropic Liquid Crystals

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing liquid crystals based on beta-peptide scaffolds.

Overview

Liquid crystals have been widely explored for applications such as display and sensing technologies. Lyotropic liquid crystals, which become more ordered as they become more concentrated within a solvent, are particularly useful for detecting the presence of biological targets, including proteins, viruses and microbes. Some alpha-peptides have been used to form lyotropic liquid crystals, but these peptides must be quite long, which limits their use.

The Invention

UW-Madison researchers have developed liquid crystals based on relatively short beta-peptide scaffolds that can be tailored to have unique properties for use in biological assays. Beta-peptides differ from conventional peptides in that certain beta-peptides form stable helices at short, oligomeric lengths, giving rise to robust, asymmetric structures. These helical beta-peptides can self-assemble to form lyotropic liquid crystals in aqueous environments.

To give the liquid crystals more desirable properties, a variety of functional groups can be added to the beta-peptides. The liquid crystals can then be used, for example, to detect an analyte, such as a protein, in a biological sample.

Applications

- Detection of proteins, cells or viruses

Key Benefits

- Modular synthesis of beta-peptides allows control over the location of functionalized side chains, including ionic groups that confer aqueous solubility and aromatic groups that influence liquid crystal properties.
- Oligomers of beta-amino acids may incorporate chemical groups and/or small molecules to further functionalize the resulting liquid crystal.
- Beta-peptides can be tailored to have specific viscosity and birefringence, important qualities for liquid crystals.
- Beta-peptides are resistant to proteolysis and generally non-toxic to cells, making them useful for biological applications, such as biomolecular sensing of proteins, cells or viruses in biological samples.

Additional Information

For More Information About the Inventors

- Samuel Gellman

Tech Fields

- Analytical Instrumentation, Methods & Materials : Sensors
- Research Tools : Detection

For current licensing status, please contact Rafael Diaz at rdiaz@warf.org or 608-960-9847