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Polymer chemistry: Micelles inside out

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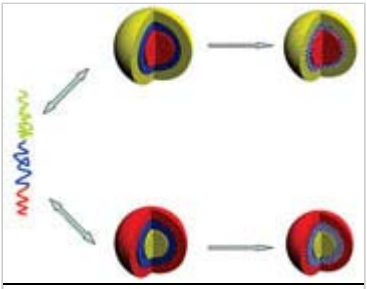
Researchers have developed co-polymer molecules that self-assemble in different micelle structures depending on their surrounding environment

Original article citation
Jiang, X., Zhang, G., Narain, R. & Liu, S. **Fabrication of two types of shell-cross-linked micelles with "inverted" structures in aqueous solution from schizophrenic water-soluble ABC triblock copolymer via click chemistry**. *Langmuir* doi:10.1021/la803616d (2009).



Co-polymer molecules that have both hydrophilic and hydrophobic parts often organize themselves into spherical structures called micelles, which have uses in medicine and biotechnology. Now Shiyong Liu at the University of Science and Technology of China in Hefei, China, Ravin Narain at Laurentian University and co-workers[1] have made a so-called 'schizophrenic' co-polymer that assembles into two different types of micelle depending on the experimental conditions.

The co-polymer used by the researchers comprises three distinct polymer sections (see image). The middle section (blue) forms cross-link bonds with other co-polymer molecules, which prevent the micelles from falling apart. The outer sections (red and yellow) are two different polymers: one called PDEA, which becomes insoluble in water at high levels of pH; and another called $PMEO_2MA$, which becomes insoluble at temperatures above 28°.

The researchers found that the co-polymer molecules assembled into micelles around 25 nm in size. The micelles have cores of either PDEA or $PMEO_2MA$, depending on the pH and temperature of the solution.

Once formed, the micelles can be made to swell, shrink, collapse or reform when conditions are changed. In the future, scientists could tailor the micelles to carry drugs around the body and automatically release them at disease sites.

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Reference

1. Jiang, X., Zhang, G., Narain, R. & Liu, S. Fabrication of two types of shell-cross-linked micelles with "inverted" structures in aqueous solution from schizophrenic water-soluble ABC triblock copolymer via click chemistry. *Langmuir* doi:10.1021/la803616d (2009). | **Article** |