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Licensing Opportunity

Force-responsive polymersomes and nanoreactors in aqueous environments

Marine bioluminescence can be triggered by turbulence and mechanical forces in water, a phenomenon that has served as inspiration for this technology.

Summary

We have developed polymersomes that become permeable upon application of mechanical force. The polymersomes retain their structure during this process, and allow water-soluble molecules to pass through the membrane.

Background

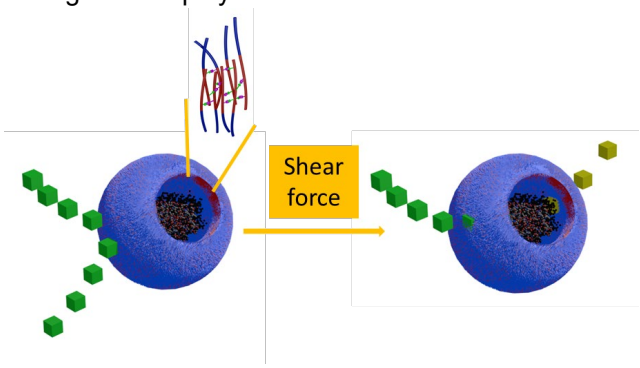
Amphiphilic block copolymers can mimic the polarity of phospholipids, and can self-assemble into a variety of defined structures such as polymersomes, which are hollow polymer vesicles.

The chemical structure of polymers allows the incorporation of chemical motives that can add functionality to polymersome membranes. Functionalized polymersomes are ideal candidates to imitate the extraordinary responses of cells to a variety of stimuli.

Nanoreactors can be obtained for example by enclosing (bio)catalysts into polymersomes. Force responsive polymersomes are also very useful for many other applications including drug delivery, selective release of fragrances, and curing agents for 3D printing.

Invention

Nucleobase-functionalized complementary amphiphilic block copolymers were self-assembled into polymersomes. The formation and cleavage of base pairs allow for the fabrication of force responsive membranes. The application of force lead to a change of permeability of the block copolymer membrane, which permits the exchange of water-soluble molecules throughout the polymer matrix.



Fields of Application

- Shear force-based drug delivery system
- Catalysis on demand
- Hydrogel formation on demand

Patent Status

Patent pending

Publication

Publication submitted

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