

Abstract Submitted
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What is nano to cells & the body? Effects of shape DENNIS DISCHER — Viruses protect, target, and deliver active agents to cells and generally have quasi-spherical and filamentous morphologies. Diblock copolymer amphiphiles can assemble in water into similar shapes, namely vesicles (or polymersomes) and worm-like micelles, that prove especially robust. Controlled release polymersomes were prepared with the hydrolysable block copolymers poly(ethyleneglycol)–poly(lactic acid) (PEG-PLA) and PEG–poly(caprolactone) (PEG-PCL). When blended with non-degradable diblocks, release reflects a highly quantized process in which any given vesicle is either intact, retaining its encapsulant, or the vesicle is porated and slowly disassembling. In vivo studies demonstrate the stealthiness of polymersomes, while emerging tests of these vesicles in cell culture demonstrate great promise for controlled release of drugs and oligonucleotides into various cell types. Similar diblock copolymers are being studied as with the vesicles, although the worm micelle formers have more symmetric proportions initially. The goal is to exploit these micelles for fluid transport and delivery of the many hydrophobic drugs to cells. In vitro studies demonstrate the degradation kinetics as well as the great flexibility and targetability of these self-assembled micelles. Surprisingly, initial in vivo studies show that microns-long worm micelles circulate in the blood stream for days longer than even the longest circulating 100 nm PEGylated vesicles.

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