

## Shape-transformation of crosslinkable glassy polymersomes from amphiphilic ABA triblock copolymers

Tamuka Chidanguro, Elina Ghimire, Yoan C. Simon

School of Polymer Science and Engineering, The University of Southern Mississippi, Hattiesburg, MS, United States

In recent years, stimuli-triggered shape transformation of polymer vesicles into non-spherical hollow morphologies such as stomatocytes and tubular structures has garnered a lot of interest. This transformation occurs as a response to the stimuli-induced changes in membrane bilayer curvature. While diblock copolymers assemble into bilayer membranes, amphiphilic triblock copolymers primarily form monolayers and their response to membrane perturbations has not been fully studied. Consequently, we studied the self-assembly behavior of the glassy amphiphilic triblock copolymers poly (ethylene glycol)-*b*-poly (styrene-*stat*-coumarin methacrylate)-*b*-poly (ethylene glycol) (PEG-*b*-P(S-*stat*-CMA)-*b*-PEG). By changing the hydrophobic volume fraction through the molecular weight of both the hydrophobic P(S-*stat*-CMA) and the hydrophilic PEG, a range of morphologies from micelles, worm-like micelles and eventually polymer vesicles were obtained. Taking advantage of the glassy nature of the triblock copolymers, we investigated the osmotic pressure-induced shape transformation of the polymer vesicles to yield kinetically trapped oblate-shaped polymersomes that have been previously observed in diblock-based glassy polymersomes. Upon crosslinking of the coumarin moiety via a [2+2] cycloaddition dimerization, the vesicles had the opposite response to osmotic pressure changes- leading to larger hydrodynamic sizes of the polymersomes with prolate morphologies. The ability to control these morphological changes will allow for the tailoring of polymersomes to improve their performance in applications such as drug delivery, bioimaging and as nanomotors.

