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Stabilizing A Double Gyroid Network Phase by Blending of LAM and CYL Forming Block Oligomers

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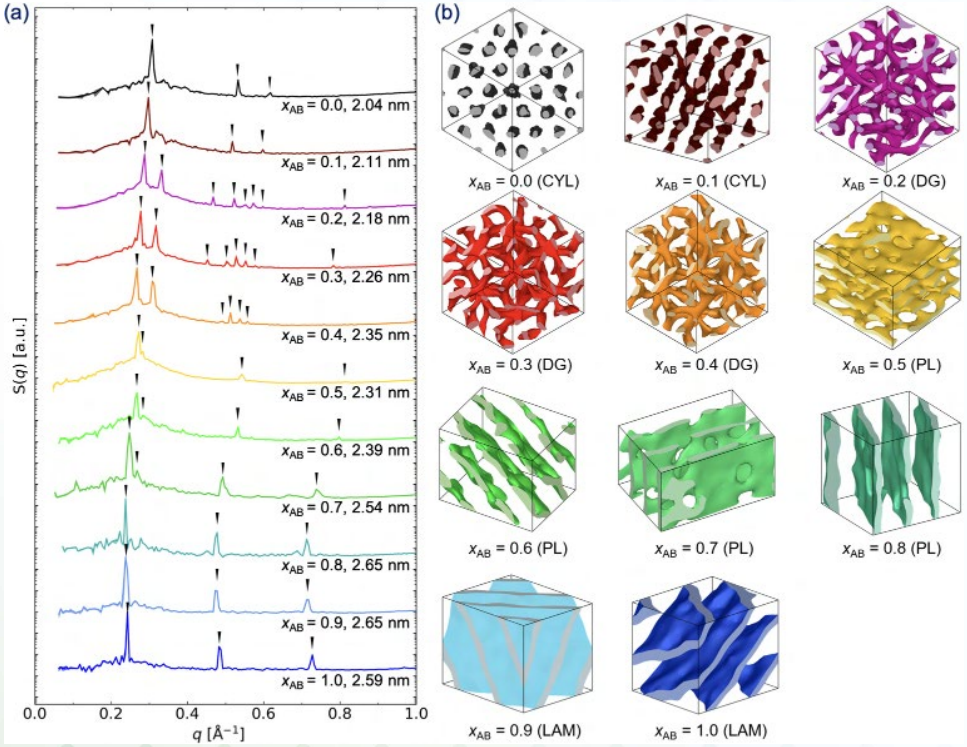
Intellectual Merit

Based on the hypothesis that blending LAM- and CYL-forming block oligomers may yield stable network phases, molecular dynamics simulations are used to study binary blend self-assembly of AB-type diblock (*n*-tridecan-1,2,3,4-tetraol) and AB_2-type miktoarm (5-octyl-tridecan-1,2,3,4-tetraol) amphiphiles. The AB_2-rich and AB-rich blends form double gyroid (DG) networks and perforated lamellae (PL), respectively. Structural analyses reveal that the non-constant interfacial curvatures of DG and PL structures are supported by local composition variations of the LAM- and CYL-forming amphiphiles.

Comparisons to self-consistent mean-field theory calculations reveal self-assembly differences and similarities between block copolymer blends and stiffer, H-bonding oligomer mixtures, suggesting new design principles for tuning shape-filling oligomer and polymer architectures to achieve wide stability windows for network phases.



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