Block copolymer self-assembly under hyperbolic confinement

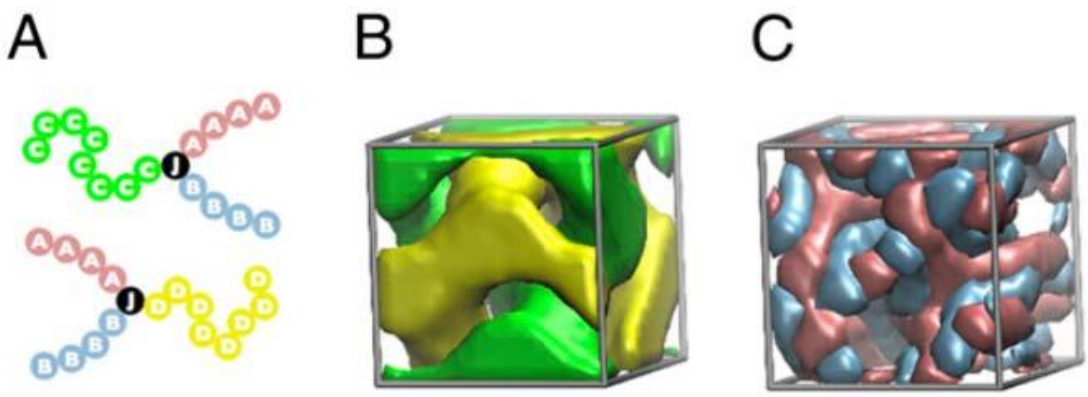
Numerical simulations reveal a family of hierarchical and chiral multicontinuous network structures self-assembled from a melt blend of Y-shaped ABC and ABD three-miktoarm star terpolymers, se figure below. These mesostructures are among the most topologically complex morphologies identified to date and represent an example of hierarchical ordering within a hyperbolic pattern, a unique mode of soft-matter self-assembly. In this project the idea is to implement a simulation setup to investigate the self-assembly of model block copolymers under different hyperbolic constraints, i.e. where the polymer are forced to assemble within a thin curved film.

Prerequisites:

✓ Preferably coding experience - not so important in what language

As a student you will:

✓ get an understanding of the fundamentals of DPD and MD ✓ implement new hyperbolic constraint simulations ✓ learn about polymer physics/chemistry ✓ learn about complex



self-assembly and hyperbolic geometry

Figure: In blends of ABC and ABD stars (A) the green and yellow majority domains form two intertwined chiral srs nets (B) separated by a hyperbolic film made from the blue and red minority components.

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Reference: Kirkensgaard JJK, Evans, de Campo and Hyde, PNAS, 111, 4, 1271-1276 (2014)