# EFFECTS OF TOPOLOGICAL COMPLEXITY IN MACROMOLECULAR ASSEMBLY

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Self-assembled polymer nanoparticles find numerous applications in soft nanotechnology and in medicine. For these applications a control over dimensions and morphology of the nanoparticles is highly important. We discuss theoretical principles of design of the smart multicompartment polymer nanoparticles by solution assembly of block copolymers with varied architecture. The statistical thermodynamic approach is applied to predict how the morphologies of the polymer nanoparticles can be controlled by combination of intramolecular solvophilic/solvophobic balance and macromolecular topology. In particular, we consider self-assembly of mictoarm stars and linear-dendritic block copolymers with either soluble or insoluble dendron blocks. We demonstrate how by changing the topology and degree of branching of one of the blocks different nanostructures (spherical or cylindrical wormlike micelles or polymersomes) can be assembled. Multicompartment polymer nanoparticles can be obtained by assembly of triblock terpolymers and we demonstrate how the theoretical model enables us to predict the shape and number of various compartments as a function of the terpolymer composition and architecture.