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Assembly and Structural Evolution of Micelleplexes YAMING JIANG, DUSTIN SPROUSE, JENNIFER LAASER, THERESA REINEKE, TIMOTHY LODGE, University of Minnesota-Twin Cities — Cationic micelles complex with DNA to form micelleplexes, which are attractive vehicles for gene delivery. We investigate the formation and structural evolution of micelleplexes in buffered solutions. The micelles are composed of poly((2-dimethylamino)ethyl methacrylate)-block-poly(n-butyl methacrylate). The formation of the micelleplexes is monitored via turbidimetric titration. With DNA oligomers, solutions of the complexes are homogeneous until near the charge neutral point, at which point the complexes precipitate. With plasmid DNA, more than a stoichiometric amount of DNA is needed to reach the inhomogeneous region, which suggests that binding is partially inhibited. This inhibition is not fully relieved when the plasmid DNA is linearized, suggesting that the stiffness of the DNA is the main source of the inhibition. With micelles in excess, the micelleplexes formed at low ionic strength exhibit bimodal size distributions and remain stable in solution. With DNA in excess, soluble micelleplexes aggregate over time and precipitate. We explain the structural evolution of the micelleplexes as an interplay between kinetic trapping and thermodynamic equilibrium, and compare the results for DNA with those for a flexible polyanion.

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