Competition between efficiency and selectivity in container assembly

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1. Abstract

Two important physical limitations for the assembly of viruses and nanocontainers are kinetic trapping and malformed structures. As an instructive model system to study the interplay between these two aspects, here we discuss the self-assembly of SAS-6 dimers into nine-fold rings, which form the structural basis of centrioles. By studying this process on a two-dimensional surface, these rings become model systems for containers. Using Brownian dynamics computer simulations of patchy particles parametrized by high speed AFM-experiments, we show that assembly efficiency and ring size selectivity cannot be achieved at the same time. We then discuss possible solutions to this dilemma. We further discuss the role of diffusion and under which conditions the system can be described by purely kinetic equations.