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Self-assembly of patchy particles: role of patch number DEBRA AUDUS, National Institute of Standards and Technology, FRANCIS STARR, Wesleyan University, JACK DOUGLAS, National Institute of Standards and Technology — The canonical model of patchy particles, a hard sphere decorated with attractive patches, has been used to describe solutions of small globular proteins, as well as micron-size particles with attractive patches. Previously, we extended the canonical model by introducing an isotropic, attractive interaction. Using Monte Carlo simulations and an analytic, Wertheim based mean-field theory, we found that although the location of the self-assembly transition lines were dependent on the isotropic interaction strength, the nature of the self-assembly was unaffected. Specifically, we developed a formalism to describe a master curve for the average molecular mass by combining Flory-Stockmayer theory with an analysis of the thermodynamics of association. We also found that the self-assembled clusters have a fractal dimension of two; this value is consistent with randomly branched polymers swollen by repulsive self-excluded volume interactions. Extending this work, we consider the role of patch number and find that the formalism still holds but becomes dependent on the number of patches. We explore the experimental implications of this finding and investigate the role of patch number on cluster shape.

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