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Non-equilibrium Ionic Assemblies of Oppositely Charged Colloids RUI ZHANG, PRATEEK JHA, MONICA OLVERA DE LA CRUZ, Northwestern University — The structure and evolution kinetics of non-equilibrium clusters formed in a solution of oppositely charged colloids are analyzed by a kinetic Monte Carlo simulation scheme. A wide range of dynamic cluster configurations are obtained by varying the various external parameters controlling the interaction strength between colloids, screening length, and packing density of colloids. At low-salt concentrations, clusters with structures ranging from NaCl-type cubic aggregates to fibril-like chains are observed, while at high-salt concentrations, disordered compact clusters are observed. A chain-folding barrier model is proposed to explain the kinetically trapped fibril-like assemblies. In higher-density solutions, ionic clusters of bigger size and percolated gel structures are observed. Our work demonstrates the structural richness of non-equilibrium ionic assemblies of oppositely charged colloids and elucidates the effect of ionic correlations, not captured by mean field models such as the modified Poisson-Boltzmann approaches, in determining the structure of assemblies of oppositely charged colloids. These "ionic composites" hold great promise in a variety of emerging applications such as templated polymerization of charged molecules and assembly of charged particles.

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