Macroscopic structures formed by quantum dot interactions
James R. Garrison\textsuperscript{1,2} and Jeffry D. Madura\textsuperscript{3}

\textsuperscript{1}Bioengineering and Bioinformatics Summer Institute, Department of Computational Biology, University of Pittsburgh, Pittsburgh, PA 15261
\textsuperscript{2}Department of Physics, Case Western Reserve University, Cleveland, OH 44106
\textsuperscript{3}Department of Chemistry and Biochemistry, Duquesne University, Pittsburgh, PA 15282

Quantum dots are extremely small particles, on the scale of a few nanometers, which exhibit quantum mechanical behavior. Due to their size and special physical properties, they are useful in the development of biosensors and imaging devices. When placed on a surface, quantum dots often form complex structures, including aggregates and rings. A model of quantum dot interactions is needed to fully understand the structures that they form under various conditions. Rabani et al. proposed a coarse-grained model which simulates evaporation on a lattice using Monte Carlo simulation with very simple rules. Their model qualitatively matched the structures that they observed in the laboratory. In addition to reconstructing their model and results, our team has added additional interactions to their model, including both short-range and long-range interactions. Specifically, we allowed each quantum dot to carry charge. We then varied the simulation’s initial conditions to observe the formation of new structures.