

Recent advances in the field of molecular engineering foreshadow future technologies in which a collective of minute size computing particles cooperatively act as programmable matter - a homogenous material that changes its shape and physical properties based on the movement and interactions of its composing particles. While computing DNA robots are difficult to manufacture, simple passive tiles that are folded from DNA strands can already be synthesized efficiently in large quantities. A trade-off between feasibility and utility is offered by the hybrid model for programmable matter, in which a limited number of active robots operate on a large set of passive tiles that serve as building blocks. In this talk, we consider the coating problem, in which the goal is to apply a thin layer of substance (composing of tiles) to completely cover the surface of a given object. We present an algorithm that solves the problem in the 3D hybrid model with a single robot in worst-case optimal $O(n^2)$ rounds.