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Two-parameter sequential adsorption model of microfiber clustering JAYSON PAULOSE, DAVID NELSON, JOANNA AIZENBERG, Harvard University — Capillary-mediated self-assembly and self-organization are useful techniques for constructing ordered superstructures from nanoscale and microscale building blocks. Square arrays of microfibers attached to a substrate have been shown to form highly ordered patterns of 2x2 fiber clusters (tetramers) under the influence of capillary forces at the surface of an evaporating liquid layer. We model this pattern formation as an irreversible sequential adsorption process on a square lattice, in which tetramers form sequentially on an initially empty lattice and locally enhance the formation of nearby tetramers, giving rise to ordering over several lattice lengths. Two parameters regulate the enhancement in tetramer formation at third- and fourth-near neighbor positions. The model is studied using computer simulations and compared to a particular realization of a self-organization experiment. We show that the model quantitatively reproduces many features of the observed patterns when the two parameters are chosen by a least-squares fit to a single experimental quantity.

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