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Jennifer E Padilla* (jenpadilla@gmail.com), Department of Chemistry, New York University, New York, NY 10003. *Programming Recursive Molecular Self Assembly.*

Tile assembly provides a framework in which to consider physical assembly processes as computations and physical structures as computable objects. Given simple rules for the attachment of tiles, one can easily simulate a Turing machine in the Tile Assembly Model making tile assembly capable of universal computation. However, rather than using the tiles to encode data, shapes and patterns of tiles may be considered to be the output of a tile computation. Substitution tilings such as the Robinson tilings, the Penrose tilings, and many others are produced by a recursive algorithm, and may be assembled hierarchically if one makes certain modifications to the Tile Assembly Model. I will present an example of how one might program tiles to self assemble hierarchically according to substitution rules, and further, how such a scheme may plausibly be embodied using DNA origami tiles. (Received January 17, 2012)