1098-52-99 **Chaim Goodman-Strauss*** (strauss@uark.edu), SCEN 301, 1 University of Arkansas, Fayetteville, AR 72701, and **Matthew J. Patitiz**, JBHT 517, 1 University of Arkansas, Fayetteville, AR 72701. *Self-assembly of hierarchical non-periodic tilings.*

Aperiodic sets of tiles have been known for nearly fifty years— such sets of tiles do admit tilings of the plane, but remarkably, only admit non-periodic tilings, tilings in which, somehow, translational symmetry is disrupted at all scales. The most famous example, the Penrose tiles bears a more than passing resemblance to many physical "quasicrystals", first discovered by Schechtman in 1982. However, local-assembly procedures, which presumably govern physical examples, proved elusive and this line of inquiry appeared closed with Dworkin and Shieh's 1995 result that any tiling with the "local isomorphism property" must include tilings of with "deceptions" of arbitrary size. This result was widely interpreted as proving that local assembly procedures could *never* exist for *any* aperiodic set of tiles.

In fact this is far from the case. We give, for any tiling substitution system satisfying mild and general conditions, and any regular language of hierarchies of supertiles arising in this system, a set of tiles in the well-studied "Abstract Tile Assembly Model" such that every infinite configuration these tiles assemble into reduces to such a hierarchy and every hierarchy arises as such an infinite self-assembled configuration. (Received January 16, 2014)