Non-additive simple potentials for pre-programmed self-assembly

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A major goal in nanoscience and nanotechnology is the self-assembly of any desired complex structure with a system of particles interacting through simple potentials. To achieve this objective, intense experimental and theoretical efforts are currently concentrated in the development of the so-called "patchy" particles. In this talk, we follow a completely different approach and introduce a very accessible model to produce a large variety of pre-programmed two-dimensional (2D) complex structures. We present a model which consists of a binary mixture of particles that interact through isotropic interactions that enable them to self-assemble into targeted lattices by the appropriate choice of a small number of geometrical parameters and interaction strengths. Our model allow us to self-assemble potentially useful structures such as chains, stripes, and Kagomé, twisted Kagomé, honeycomb, square, Archimedean and quasicrystalline tilings.