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Targeted self-assembly of complex lattices and meta materials from isotropic interactions OSKAR LINDGREN, ERIK EDLUND, MARTIN NILSSON JACOBI, Chalmers University of Technology — I will present an analytical method for designing isotropic interactions causing particles to self-assemble into complex lattices. The method is direct as opposed to previous trial and error schemes where the interactions are modified and tested until the desired pattern self-assembles. Since a naive implementation of the design scheme generally yields interaction potentials too complicated to implement experimentally, we provide a systematical simplification scheme to minimize the interaction potentials' complexity without changing which pattern is produced by the self-assembly process. We also prove that our suggested simplification scheme is optimal. The method has been tested using simulated systems and proven to work for a wide range of patterns, ranging from chiral 2D surfaces to 3D diamond-like crystals. The recent improvements in simplicity for the designed potentials makes experimental realization feasible. The interactions can also be designed so that the self-organizing systems obtain different material properties like directional sound propagation or stealth-like properties via the diffraction pattern.

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