

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: Spontaneous selfassembly of 7 rotors from random initial conditions in the high viscosity bath (left), and the low viscosity bath (right).

File Name: Supplementary Movie 2

Description: Two counter rotors, (left) attracting and propagating as a bound pair. Two same-spin rotors (right) orbiting and spiraling out.

File Name: Supplementary Movie 3

Description: Two dimers approaching, colliding, pair-switching and propagating away in a perpendicular direction, until meeting again and forming a 4-gyromer.

File Name: Supplementary Movie 4

Description: Dynamics of 20 rotors in the high viscosity bath with random initial conditions, showing a dynamic steady state in which chains are forming, colliding, and reforming.

File Name: Supplementary Movie 5

Description: Dynamics of 14 rotors in the low viscosity bath, reaching a steady state of a single long chain.

File Name: Supplementary Movie 6

Description: Simulations of 20 rotors in free-space or confined to a disk.

File Name: Supplementary Movie 7

Description: Simulations with periodic boundary conditions, showing a few values of concentration and of beta (inertia), reaching different phases (disordered, gyromers, crystals, and rings).

File Name: Supplementary Movie 8

Description: Breakage of an 11- gyromer due to failure of one of the batteries.