Electronic Supplementary Information (ESI):

Collective oscillation in dense suspension of self-propelled chiral rods

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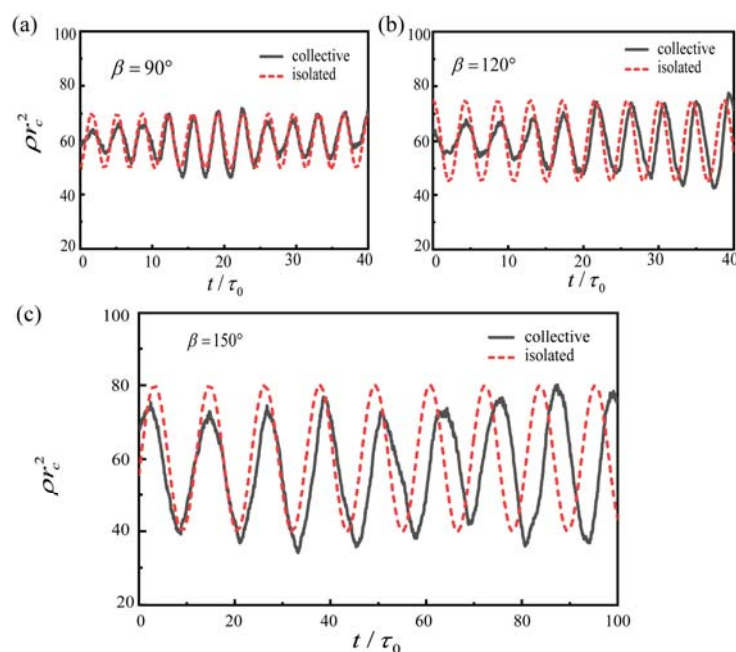
Supplementary Figure

Fig. S1. Local number density as a function of time for various chiral rods with arm-length ratio $\alpha = 3$ and (a) $\beta = 90°$, (b) $\beta = 120°$, (c) $\beta = 150°$. The period of collective oscillation (black solid line) and isolated motion (red dotted line) are compared. Deviation are 1.3%, 4.2% and 9.7%, respectively. When β increases, the maximum magnitude of the local density increases, because alignment induced by

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elongated shape promotes more dense packing.

Supplementary Movies

Supplementary Movie 1: **Simulation animation of the dynamics of chiral rods** ($\beta = 90°$)**.** The animation of 4000 active chiral L-shaped rods under the self-propulsion and repulsive interaction. The aspect ratio is $\alpha = 6/3$. Other simulation parameters: active force magnitude $F_a = 15kT/d$ and Yukawa amplitude $U_0 = 25kT$. The movie shows the formation of collective oscillation from initial random distribution.

Supplementary Movie 2: **Simulation animation of the dynamics of achiral rods** ($\beta = 180°$)**.** The animation of 4000 active achiral straight rods under the self-propulsion and repulsive interaction. The system parameters are the same as Movie S1. The movie shows the formation of stable giant clusters from initial random distribution.

Supplementary Movie 3: **Contour of number density field in the chiral system** ($\beta = 90°$)**.** The movie of contour of rod number density field in the chiral system corresponding to the case in Movie S1. There are 4000 L-shaped rods and the area fraction $\phi = 20\%$. The system at the beginning of the movie has reached the steady state. The color bar reflects the degree of intensity.

Supplementary Movie 4: **Contour of number density field in the achiral**

system ($\beta = 180°$)**.**The movie of contour of rod number density field in the achiral system corresponding to the case in Movie S2. There are 4000 straight rods and the area fraction $\phi = 20\%$. The system at the beginning of the movie has reached the steady state. The color bar reflects the degree of intensity.