

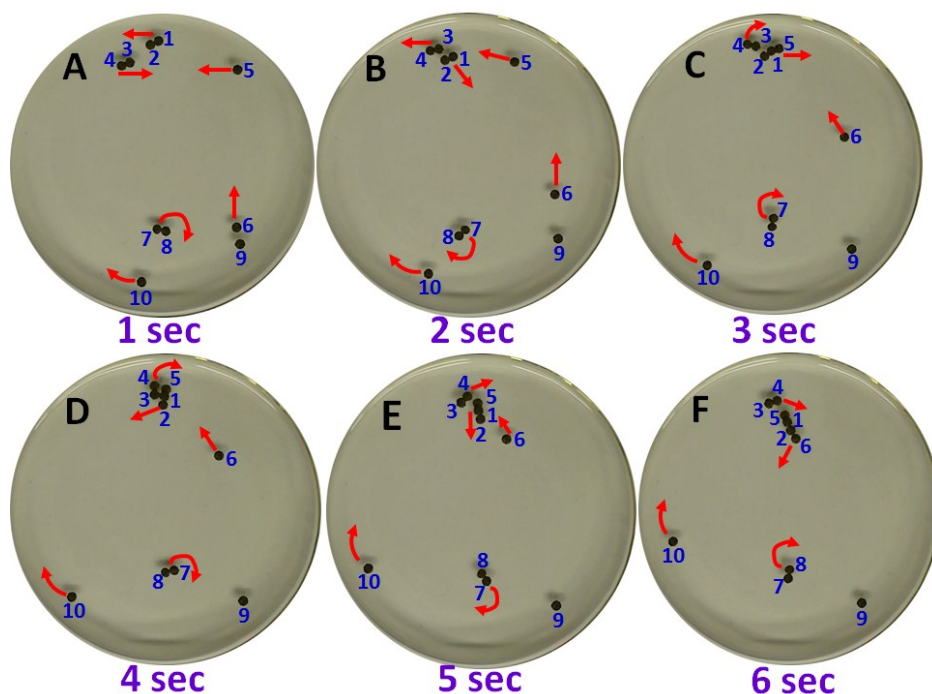
## Co-operative Motion of Multiple Benzoquinone Disks at the Air-Water Interface

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### Supporting Information

**Supplementary Video 1** Particle collisions transpiring during continuous, translational self-motion of ten BQ disks at the air-water interface.

**Supplementary Video 2** Four BQ disks demonstrating particle coupling between one another during self-motion at the air-water interface.

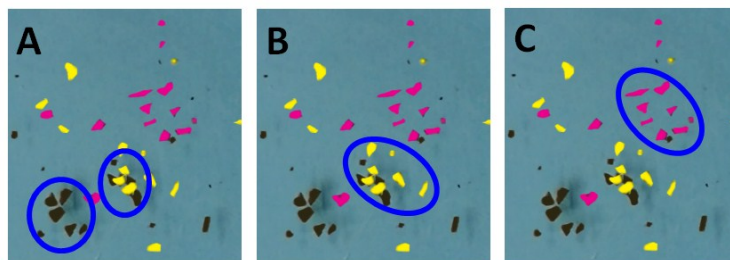


**Figure S1** Snapshots at 1 sec time intervals for 10 BQ disks, individual numbered, contained in a single petri dish. Each frame demonstrates multiple co-operative coupling events can occur and through self-motion the co-operative couplings may acquire other BQ disks.

**Supplementary Video 3** Ten BQ disks that exhibit multiple particle couplings at once between numerous BQ disks at the air-water interface.

**Supplementary Video 4** High frequency cycling of irregular shaped BQ particles that developed after > 15 min of particle locomotion.

**Supplementary Video 5** Termination of self-motion of six BQ particles upon the addition of a strong surface-active chemical, Tween-20.



**Figure S2** Extracted the superimposed snapshots at 4 s time intervals of Figure 7B to highlight the flocks described in the Results section. A) Blue circle around green BQ pieces highlights two co-operative flocks formed during self-motion. B) Blue circle around yellow BQ pieces highlights one co-operative flock that formed after an additional 4 s translational motion. C) Blue circle around pink pieces highlights the new co-operative flock that transpired after an additional 4 s translational motion.

**Supplementary Video 6** Collective, co-operative flocking of irregular shaped BQ particles at the air-water interface.

**Supplementary Video 7** Salt dependent study using 0 mM NaCl to demonstrate the effect on the BQ particle self-motion.

**Supplementary Video 8** Salt dependent study using 500 mM NaCl to demonstrate the effect on the BQ particle self-motion.