Supporting Information

Rotating Crystals of Magnetic Janus Colloids

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Supplementary Movie legends

Supplementary Movie 1: A liquid cluster transforms into a rotating crystal as the strength of the magnetic field (20 Hz) is raised from 0.5 mT to 1.0 mT. The movie is played in real time.

Supplementary Movie 2: A small cluster first attracts and then unites with an isolated particle to form a hexagon. Note the orientation change of the Janus particle being incorporated. The magnetic field has strength 1.5 mT and frequency 20 Hz. The movie is slowed 3 times.

Supplementary Movie 3: A large crystal with shear-melted edge. The magnetic field has strength 1.5 mT and frequency 20 Hz. The movie is played in real time.

Supplementary Movie 4: Dislocation dynamics in a rotating crystal. The magnetic field has strength 1.5 mT and frequency 20 Hz. The movie is slowed 3 times.

Supplementary Movie 5: Periodic fracturing and healing of a *large* rotating crystal. The magnetic field has strength 1.5 mT and frequency 20 Hz. The movie is speeded 2 times.

Supplementary Movie 6: Periodic fracturing and healing of a *small* rotating crystal. The magnetic field has strength 1.5 mT and frequency 20 Hz. The movie is slowed 3 times.