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Active Self-Assembled Spinners: dynamic crystals, transport and induced surface flows ALEXEY SNEZHKO, GASPER KOKOT, Argonne National Laboratory — Strongly interacting colloids driven out-of-equilibrium by an external periodic forcing often develop nontrivial collective dynamics. Active magnetic colloids proved to be excellent model experimental systems to explore emergent behavior and active (out-of-equilibrium) self-assembly phenomena. Ferromagnetic micro-particles, suspended at a liquid interface and energized by a rotational homogeneous alternating magnetic field applied along the supporting interface, spontaneously form ensembles of synchronized self-assembled spinners with well-defined characteristic length. The size and the torque of an individual self-assembled spinner are controlled by the frequency of the driving magnetic field. Experiments reveal a rich collective dynamics in large ensembles of synchronized magnetic spinners that spontaneously form dynamic spinner lattices at the interface in a certain range of the excitation parameters. Non-trivial dynamics inside of the formed spinner lattices is observed. Transport of passive cargo particles and structure of the underlying self-induced surface flows is analyzed. The research was supported by the U.S. DOE, Office of Basic Energy Sciences, Division of Materials Science and Engineering

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