# Smart Magnetic Colloids Act Like Tiny Robots

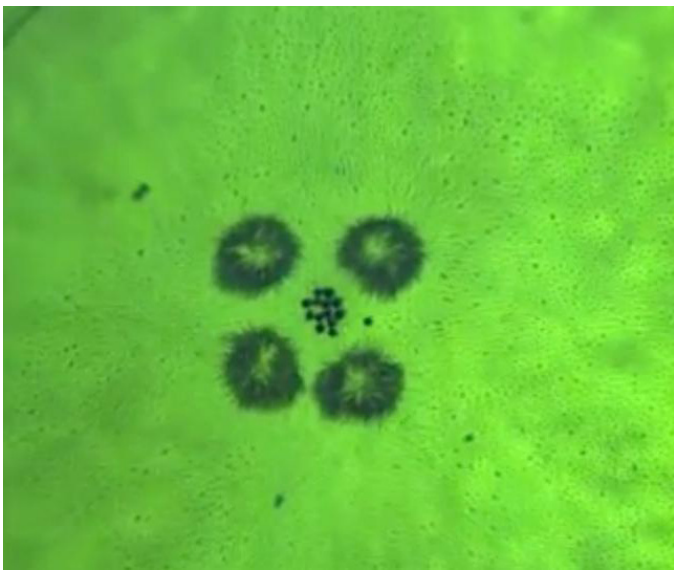
*The ability to manipulate colloidal structures (ordered arrays of microscopic particles suspended in liquid) is crucial for further development of dynamically responsive self-assembled materials capable of performing useful functions, such as recognition and mechanical manipulation of target particles. Much of material science is occurring at the micro- and mesoscale, where materials are being asked to perform more and more elaborate mechanical and self-repairing functions.*

## The Challenge

To create new self-assembled colloidal structures that perform elaborate mechanical tasks.

## The Solution

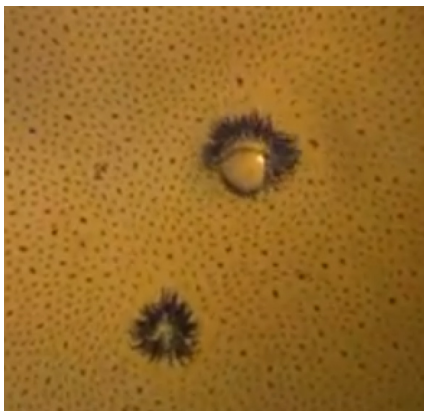
Argonne has developed an innovative method for the directed formation and manipulation of colloidal assemblies that grasp, transport and release cargo particles.



*The robots, just half a millimeter wide, are composed of microparticles. Confined between two liquids, they assemble themselves into star shapes when an alternating magnetic field is applied.*

## The Results

One feature of this new approach, which imitates the operation of much more complex biological and technological machines but with simple and inexpensive constituents, is the ability to control assembly shape and locomotion in response to outside stimulation. Magnetic microparticles, which self-assemble into star-like shapes, can be manipulated to close around a target particle, swim, and then release the particle at a desired location. This discovery may influence the design and fabrication of "smart materials" that must self-repair, multi-task and reconfigure themselves.



***"For us, this is very exciting. This is a new paradigm for reconfigurable self-assembled materials that can perform useful functions,"*** **said Igor Aronson, senior physicist.**



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March 2012