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Multipolar Magnetic Active Matter

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While magnetic active matter already exists in natural systems, such as magnetotactic bacteria, it is also the subject of much synthetic refinement, motivated primarily by medical applications such as targeted drug delivery. In this contribution, we present a study of a new synthetic magnetic active system: microbots with dipolar and quadrupolar interactions. The rationale for this is simple: while the self-propulsion mechanisms of Active Matter allow us to control a wide range of motions, this does not necessarily extend to also controlling the rotation. Conversely, dipolar (and multipolar) matter offers orientational control, but lacks effective independent propulsion. We explore the novel phase behavior unlocked by these anisotropic interactions, concurrent experimental realizations, and discuss the system's behavior in external magnetic fields.

Type:

Oral