FIELD-DIRECTED ASSEMBLY OF RESPONSIVE COLLOIDS

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Field-directed self-assembly (DSA) has recently moved into the focus of the soft-matter and nanotechnology community. It employs the basic principles of self-assembly through carefully chosen building blocks, but the underlying self-assembly process is then aided or modulated using external fields. Here we demonstrate how we can apply a combination of responsive nanoparticles and external electromagnetic fields in order to modulate the intrinsic interparticle interactions and tune the subtle balance between thermal motion and the action of interparticle forces, and thus generate novel self-assembled structures. We will show in particular how we can use field-driven self-assembly to induce phase transitions, cycle through various equilibrium and non-equilibrium phases, and study the micro-structural changes and the underlying kinetic mechanisms of these phase transitions in-situ and in real time. Moreover, we will demonstrate the effect of particle anisotropy in field-driven assembly.

References

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