Synthetic self-assembly with life-like properties

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Self-assembly is both an advantageously spontaneous process to organize molecular or colloidal entities into functional superstructures and a key-feature of how life builds its components. However, compared to their living counterparts, synthetic materials made by self-assembly usually lack some of the interesting properties of living systems such as multicomponent character or capability to adapt, transform and evolve. In this presentation, I will describe different systems where life-like properties can emerge from self-assembled synthetic materials. I will first show that user-defined and elaborate nanostructures can be obtained by the isothermal self-assembly of hundreds of different DNA bricks and proteins with a unique capability to self-organize, grow, optimize, adapt and evolve. At a micro- to macroscopic scale, I will describe self-assembled colloidal crystals evidencing other interesting life-like properties, such as dissipative organization or living crystallization.