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Self Assembly of Soft Matter Quasicrystals and Their Approximants[1] CHRISTOPHER IACOVELLA, AARON KEYS, SHARON GLOTZER, University of Michigan Chemical Engineering Dept — The discovery of soft-matter quasicrystals (QCs) and their approximants [1-4] hints at a unique thermodynamic mechanism underlying their stability. In the past, specific interaction potentials have been contrived to stabilize QCs and their approximants in computer simulations, but such interactions are difficult to achieve in colloidal systems. Here, we use molecular simulation to demonstrate an alternative approach for assembling dodecagonal QCs and their approximants based solely on particle functionalization and shape [5]. Our approach replaces complex energetic interactions with simpler-to-achieve bonded and excluded-volume interactions, encouraging the formation of structures with low surface contact area, including non-close-packed and polytetrahedral structures. We argue that this mechanism can be widely exploited to assemble QCs and approximants in colloidal systems, and may further elucidate the formation of soft matter QCs in experiment [1-4].

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