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Assembly and melting of DNA nanotubes and tile lattices
THOMAS SOBEY, STEPHAN RENNER, FRIEDRICH SIMMEL, Biomolecular Systems und Bioelectronics, Physics Department E14, Technical University Munich, 85748 Garching, Germany — Programmable molecular self-assembly using DNA is allowing the demonstration of increasingly novel nanoscale structures such as lattices and tubes. Understanding the assembly and melting pathways of these will allow us to develop more complex and/or stable structures, and potentially useful nanomaterials. We experimentally show differences in these pathways by correlating temperature-controlled UV absorption measurements with atomic force microscopy, fluorescence microscopy, and transmission electron microscopy measurements. The three-dimensional nanotubes assemble in several hierarchical steps but melt in a single step, and this contrast is proposed to arise from the fundamental distinction between three-dimensional closed tubes and two-dimensional open lattices.

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