

Abstract Submitted
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Instabilities in Nanoporous Media JIUN-TAI CHEN, MINGFU ZHANG, THOMAS RUSSELL, University of Massachusetts, Amherst — We studied Rayleigh instabilities in thin polymer films confined within nanoporous alumina templates. Thin films of PMMA were generated by filling cylindrical nanopores of an anodic aluminum oxide (AAO) membrane with a PMMA solution in chloroform followed by solvent evaporation. Undulations in the film thickness were observed that were induced by a Rayleigh instability when the PMMA nanotubes were annealed above the glass transition temperature (T_g). The amplitude of the undulations increased with time and eventually bridged across the cylindrical nanopore in the AAO membrane, resulting in the formation of polymer nanorods with periodically encapsulated holes. A similar behavior was observed when PMMA films were confined within carbon nanotubes (CNT). The Rayleigh instabilities in these confined geometries offer a novel means of controlling and fabricating the polymer nanostructures. These compartmentalized nanorods may have potential applications as delivery devices.

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