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Exploration of novel composite microstructured fibers from capillary instability DAOSHENG DENG, MIT, JEAN-CHRISTOPHE NAVE, McGill University, X. LIANG, S.G. JOHNSON, Y. FINK, MIT — Recently, a new class of multi-materials fiber that incorporates micrometer-thickness cylindrical sheets of glass into polymer matrix has emerged. Understanding of the complicated viscous flow during this thermal drawing processing remains a great challenge theoretically. Here, from an aspect of a single instability mechanism, classical Plateau-Rayleigh instabilities in the form of radial fluctuation, we explore the stability of various microstructures (such as shells and filaments) in our composite fibers. We find that the observed structures are consistent with analysis. Furthermore, a viscous materials map is established for materials selection, which agrees with various identified materials excellently. These results not only provide insights into other forms of instabilities of viscous fluid, but also guide more diverse nanostructures (such as filaments and droplets) in the microstructured fibers.

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