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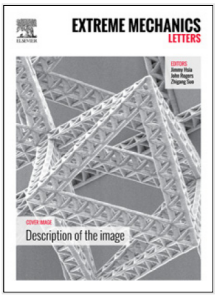

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Collapse of Microfluidic Channels/Reservoirs in Thin, Soft Epidermal Devices

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Abstract

Self-collapse is a common problem encountered in fabrication of thin, soft epidermal microfluidic devices, due to the adhesion between top and bottom covers. Analytic models are developed for collapse of both long microfluidic channels and circular microfluidic reservoirs, with their covers modelled as plane-strain beam and thin plate, respectively. The analysis shows that a single parameter, the normalized work of adhesion, which combines the effects of channel/reservoir geometry, work of adhesion and bending stiffness of top and bottom channel/reservoir covers, controls different collapse states (no collapse, meta stable collapse and stable collapse). The established models agree well with the experimental observations,