

Abstract Submitted
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Mechanical characterization of capsule properties using abrupt-step channels ANNE-VIRGINIE SALSAC, ANNE LE GOFF, BADR KAOU, DOMINIQUE BARTHS-BIESEL, Universite de Technologie de Compiegne - CNRS, BIOMECHANICS BIOENGINEERING LAB TEAM — Capsules consisting of a liquid droplet enclosed by a thin polymerized membrane are commonly encountered in nature (cells) or in industrial process (pharmaceutical, cosmetic or food products). The mechanical properties of the capsule wall are essential to guarantee the particle integrity and release of the internal contents when and where necessary. The difficulty is to assess the mechanical properties of the thin membrane. We will show how abrupt-step channels can be used to identify the membrane viscoelastic properties and point of rupture. This can be achieved by using a channel presenting a step change in cross-section and inverting the direction of the flow of the capsule suspension within the tube. To deduce information on the viscoelasticity, we will exploit the relaxation of the capsules as they flow through the expansion. To study membrane rupture, we will instead invert the channel, block the capsules at the neck of the constriction and determine the pressure difference needed for breakup. All the experiments will be conducted on initially spherical capsules with a thin cross-linked protein membrane for a proof of concept.

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