## Growth-induced wrinkling in unconstrained biomimetic "leaves"

Ido Levin and Sarah L. Keller





YES! Examples are commonly seen in leaves, flowers, fungi, and sea slugs.

We investigate free-standing sheets that undergo significant spatial variations in growth rate. In these sheets, wrinkling patterns develop as a mechanism to avoid stretching while localizing bending. We characterize these wrinkles, examining how their wavelengths scale with the width and thickness of the sheet and how they form in confined regions that depend on the curvature of the sheet.

The images show how we use this instability to create biomimetic leaves from elastomers. In the artificial leaves, soft, hygroscopic tissue lies on both sides of a rigid, passive, narrow stem. Upon hydration, wrinkles emerge, mimicking the shapes of leaves. The wrinkles fit the following scaling law:

wavelength

thickness

Dept. of Chemistry, Univ. of Washington

