Abstract Submitted
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Liquid crystalline pattern formation in drying droplets of biopolymers[1] IVAN SMALYUKH, University of Illinois at Urbana-Champaign and Kent State University, OLENA ZRIBI, University of Illinois at Urbana-Champaign, JOHN BUTLER, University of Illinois at Urbana-Champaign, OLEG LAVRENTOVICH, Kent State University, GERARD WONG, University of Illinois at Urbana-Champaign — When a droplet of DNA in water dries out, a ring-like deposit is observed along the perimeter, similar to the stains in spilled drops of coffee. However, the dried ring of DNA is a self-similar birefringent pattern composed of extended molecules. We examine dynamics of the pattern formation at the droplet's rim. This gives us an insight into the underlining physics. During the major part of drying process the contact line is pinned so that DNA molecules are brought to the perimeter and extended by the radial capillary flow. Lyotropic nematic phase is formed in which highly concentrated DNA aligns along the triple line to minimize elastic energy. When the contact angle becomes small, the contact line starts to retract and the radial dilative stress causes buckling distortions at the rim which then propagate deep into the elastic liquid- crystalline medium and give rise to the pattern.

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