

Title: Liquid crystal necklaces: cholesteric drops threaded by thin cellulose fibres

Author(s): Geng, Yong ^[1]; Sec, David ^[2]; Almeida, Pedro L. ^[1,3]; Lavrentovich, Oleg D. ^[4,5]; Zumer, Slobodan ^[2,6,7]; Godinho, Maria H. ^[1]

Source: Soft Matter **Volume:** 9 **Issue:** 33

Pages: 7928-7933 **DOI:** 10.1039/c3sm50900a **Published:** 2013

Document Type: Article

Language: English

Abstract: Liquid crystals in confined geometries exhibit numerous complex structures often including topological defects that are controlled by the nematic elasticity, chirality and surface anchoring. In this work, we study the structures of cholesteric droplets pierced by cellulose fibres with planar anchoring at droplet and fibre surfaces. By varying the temperature we demonstrate the role of twisting power and droplet diameter on the equilibrium structures. The observed structures are complemented by detailed numerical simulations of possible director fields decorated by defects. Three distinct structures, a bipolar and two ring configurations, are identified experimentally and numerically. Designing cholesteric liquid crystal microdroplets on thin long threads opens new routes to produce fibre waveguides decorated with complex microresonators.

KeywordPlus: Topological Defects; Nematic Droplets; Microdroplets; Colloids; Lasers

Reprint Address: Zumer, S (reprint author) - Univ Ljubljana, Fac Math & Phys, Ljubljana 1000, Slovenia

Addresses:

[1] Univ Nova Lisboa, FCT, Dept Cienciadados Mat, CENIMAT I3N, P-2829516 Caparica, Portugal

[2] Univ Ljubljana, Fac Math & Phys, Ljubljana 1000, Slovenia

[3] Inst Politecn Lisboa, ISEL, Area Dept Fis, P-1950062 Lisbon, Portugal

[4] Kent State Univ, Liquid Crystal Inst, Kent, OH 44242 USA

[5] Kent State Univ, Chem Phys Interdisciplinary Program, Kent, OH 44242 USA

[6] Ctr Excellence NAMASTE, Ljubljana 1000, Slovenia

[7] Jozef Stefan Inst, Ljubljana 1000, Slovenia

E-mail Addresses: y.geng@fct.unl.pt; david.sec@fmf.uni-lj.si; palmeida@adf.isel.pt; olavrent@kent.edu; slobodan.zumer@fmf.uni-lj.si; mhg@fct.unl.pt

Funding:

Funding Agency	Grant Number
NSF	DMR 1104850
ARRS program	P1-0099
Portuguese Science and Technology Foundation	SFRH/BD/63574/2009 PTDC/CTM-POL/1484/2012 PTDC/FIS/110132/2009 PEst-C/CTM/LA0025/2011 LA 25-2011-2012

Publisher: Royal Soc Chemistry

Publisher Address: Thomas Graham House, Science Park, Milton RD, Cambridge E CB4 0WF, Cambs, England

ISSN: 1744-683X

Citation: GENG, Yong; SEC, David; ALMEIDA, Pedro L.; LAVRENTOVICH, Oleg D.; ZUMER, Slobodan; GODINHO, Maria H. - Liquid crystal necklaces: cholesteric drops threaded by thin cellulose fibres. Soft Matter. ISSN 1744-683X. Vol. 9, nr 33 (2013), p. 7928-7933.

