

Helices with different curvature and torsion along elastic micro/nano filaments

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To decorate Christmas presents ribbons with vivid colors in one side and dull in the other are often used. Beautiful helices with different curvature and torsion are generated if, under pressure, the edge of a sharp object is swept in the dull side. If the number of times and the pressure of passage of the sharp object are not constant lengthwise the intrinsic curvature varies and helices with different curvature and torsion develop along the ribbon.

Previous work indicates that elastic filaments can acquire intrinsic curvature and the formation of perversions between helices with opposite handedness's were addressed [1-3].

In this work we address the formation and the precise control of helices with different intrinsic curvatures existing along and in distinct micro/nano filaments, by coupling experimental results with simulations (figure) [4]. The elastic micro/nano fibers are produced by electrospinning being their shapes crucial for the fabric assembling and the performance of the final material.

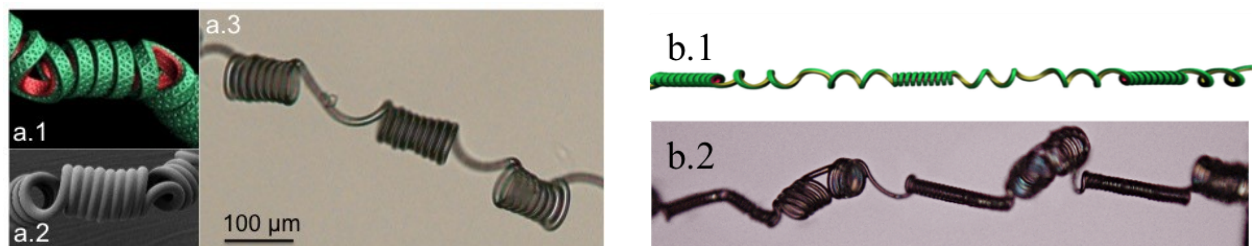


Figure (a.1) and (b.1) Simulations exemplifying the formation of a filament with the (a) same and (b) different curvature along lengthwise. The micro optical photos and scanning electron microscopy picture (a.2) are from electrospun filaments.

[1] T. McMillen, A. Goriely, *Journal of Nonlinear Science*, 12, 241-281 (2002).

[2] P. Pieranski, J. Baranska, A. Skjeltop, *European Journal of Physics*, 25(5), 613-621 (2004).

[3] P:E.S. Silva et al., *Scientific Reports*, 6 (2016).

[4] P:E.S. Silva et al., submitted