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Webinars

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Moisture-Responsive Networks Inspired by Nature

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Plants can program cellulose-based dead tissues to respond to external stimuli, usually water. One of these examples is the awns of the Erodium fruit, which present amazing coil and uncoil motions in response to humidity. Due to its intrinsic curvature, the straight awns existing in the Erodium plants acquire the shape of a right-handed helix after leaving the fruit with the seed. When in contact with water, the awn unwinds, allowing the seed to bury in the soil. Structures resembling the characteristics of liquid crystalline elastomers are at the genesis of these movements. While swollen in water, ribbons isolated from Erodium awns are transparent, presenting birefringence between cross polars. Depending on the moisture quantity, these ribbons change reversible shape from left to right-handed helices. These movements result from anisotropic cellulose-based materials organized in layers that contract differently upon the presence of humidity. Inspired by these Nature designs, our work focus on the development of cellulose-based membranes to be used as sensors produced from different cellulosic chiral liquid crystalline phases. Shear-casting techniques were used to produce the hydromorphic crosslinked hydroxypropyl cellulose films with structural colour. A structural study will be presented, and the selected films will be tested on the presence of moist to evaluate their morpho and colour change performance. Cellulose-based Nature inspired materials have significant potential for opening new routes to produce novel mobile soft materials with tremendous impact on the society.

Short Bio

Researcher at the Portuguese Centre for Sustainable Chemistry LAQV-Requimte, awarded through a competitive international call by the Portuguese Foundation of Science. She is also a collaborator at CENIMAT|i3N at NOVA School of Science and Technology, Caparica, Portugal.

Her research focuses on biomimetic materials, particularly membranes, fibre-based systems, and stimuli-responsive materials inspired by nature. She has developed extensive expertise in liquid crystals, particularly cellulose-based crystalline and photonic systems, investigating their self-assembly, optical properties. She is a founding and board member of the Portuguese Liquid Crystal Society and member website editor of the International Liquid Crystal Society.

Her scientific contributions have been recognized with several awards and fellowships. https://www.scopus.com/authid/detail.uri?authorId=57191899755.

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