Twisted Twins: What Happens When a Constrained Soft Material Spontaneously Deforms?

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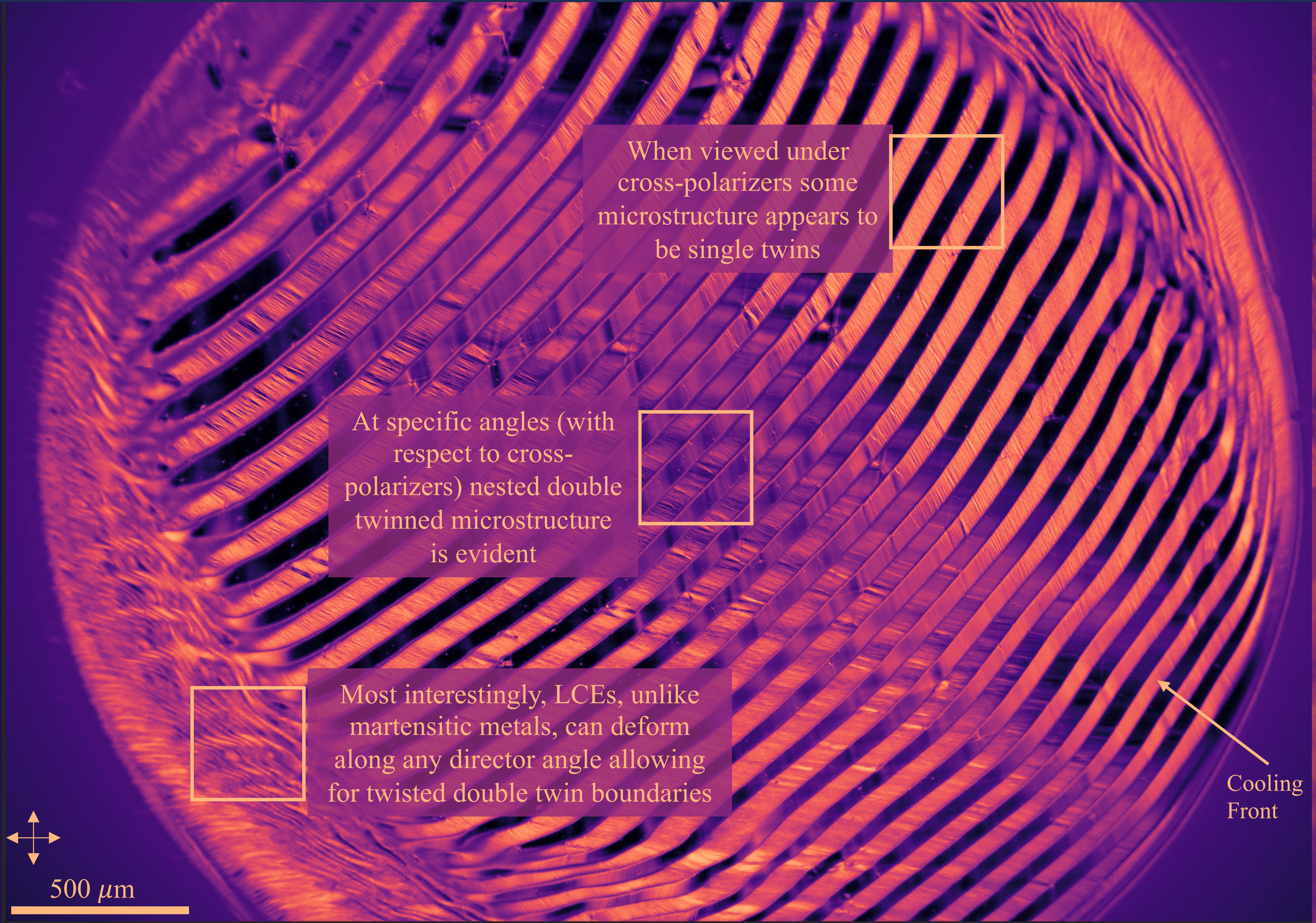
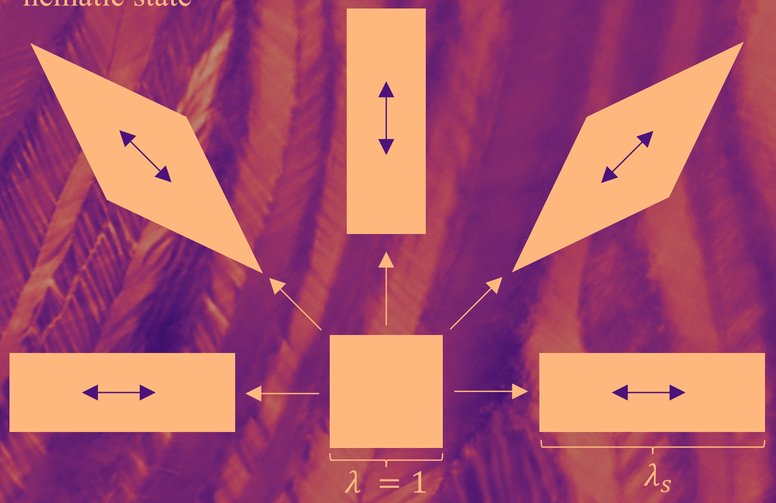


When viewed under cross-polarizers some microstructure appears to be single twins

At specific angles (with respect to cross-polarizers) nested double twinned microstructure is evident

Most interestingly, LCEs, unlike martensitic metals, can deform along any director angle allowing for twisted double twin boundaries

Liquid crystal elastomers (LCEs) undergo spontaneous deformations, λ_s, upon cooling from the isotropic to nematic state



Similar to martensitic metals, LCEs form striped twin domains when constrained to $\lambda < \lambda_s$

When a biaxially strained LCE blister is directionally cooled it forms a myriad of twined microstructure to accommodate the imposed constrained deformation

100 μm