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Switchable adhesion of liquid crystalline elastomers JAMES ADAMS, ANDREW BROWN, University of Surrey, UNIVERSITY OF SURREY TEAM — Liquid crystal elastomers (LCEs) are rubbery materials that composed of liquid crystalline polymers (LCPs) crosslinked into a network. The rod-like mesogens incorporated into the LCPs are have random orientations in the high temperature isotropic phase, but can adopt the canonical liquid crystalline phases as the temperature is lowered. LCEs have not yet found a key application, however, these materials are highly dissipative. I will describe a proposed application of reversibly switchable pressure sensitive adhesives (PSAs). The quality of their adhesion can be measured by the tack energy. To investigate their performance as switchable PSAs we compare the tack energy for the director aligned parallel, and perpendicular to the substrate normal, with that for the isotropic state using a finite element model that incorporates cavitation within the adhesive layer. The constitutive properties of the LCE are modelled using the nematic dumbbell model. We find that the tack energy depends on the director orientation, with parallel orientation of the nematic having higher tack energy than both the isotropic and the perpendicular director orientation [1]. I will report on how this model compares with recent experiments on LCE PSAs. [1] Soft Matter, 2013,9, 1151-1163

James Adams
University of Surrey

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