Abstract Submitted
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Incompressible Biaxial Nematic Liquid Crystal Elastomers for Artificial Muscles P.E. CLADIS[1], Advanced Liquid Crystal Tech., SIMON KRAUSE[2], Macromolecular Chemistry, YUSRIL YUSUF[3], Physics Department, S. HASHIMOTO[4], Department of Applied Quantum Physics and Nuclear Engineering, L. FEL[5], Department of Civil Engineering, HEINO FINKELMANN[6], Macromolecular Chemistry, SHOICHI KAI[7], Graduate School of Systems Life Sciences — Assuming only incompressibility, in the simplest complete theory for monodomain liquid crystalline elastomers as rectangular parallelepipeds, we find two biaxial nematic phases, N_{2+} and N_{2-} with a first order $N_{2+} - N_{2-}$ transition exhibiting spontaneous shape change. We identify N_{2+} as icosahedral (Y_h) and N_{2-}, as simple orthorhombic (D_{2h}) nematics. Using standard orientational mechanics, we derive the stress-strain behavior before swelling to pin-point the recently discovered elastic strain limits for swelling with $5CB$.

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