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Magnetoactive Liquid Crystal Elastomers MORITZ WINKLER, Heinrich Heine Universitaet Duesseldorf, ANDREAS KAISER, Heinrich Heine-Universitaet Duesseldorf, SIMON KRAUSE, HEINO FINKELMANN, Albert Ludwigs-Universitaet Freiburg, ANNETTE SCHMIDT, Heinrich Heine-Universitaet Duesseldorf, DUESSELDORF TEAM, FREIBURG TEAM — Liquid crystal elastomers (LCEs) offer an interesting spectrum of properties, including temperature induced, fully reversible shape changes connected with considerable development of pulling force, and synthetic diversity. In order to take advantage of LCEs for an extended number of viable devices, it is desirable to trigger such shape changes with electromagnetic fields rather than temperature changes. Magnetoactive LCEs are accessible by the incorporation of superparamagnetic Fe_3O_4 nanoparticles into oriented nematic side-chain LCEs and offer a contactless activation pathway to activate the nematic-to-isotrope transition by local magnetic heating in external fields due to relaxational processes. In magnetomechanical measurements at 300 kHz and 43 $kA{\cdot}m^{-1}$, a sample contraction of up to 30 % is observed under field influence, that is fully released when the field is switched off. The load evolved reaches 60 kPa and more. The materials' ability to respond to a contactless electromagnetic stimulus with a well-defined contraction can be of use for various actuator applications.

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