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**Polydomain-Monodomain Transition of Randomly Disordered Nematic Elastomers with Different Crosslinking Histories** KENJI URAYAMA, ETSUKO KOHMON, RYO MASHITA, TOSHIKAZU TAKIGAWA, Kyoto University — When the mesogenic molecules (polymers) are crosslinked without a special care for global alignment, the resultant networks have a polydomain structure with local orientational order (in the order of micron) but without macroscopic order. It is well known that such polydomain liquid crystal elastomers (PLCE) exhibit a transition to the monodomain state with global orientation under a finite stretching stress. In present study, we examine the polydomain-monodomain (PM) transition of the two types of PLCE (I-PLCE and N-PLCE) that are originally formed in the high-temperature isotropic or low-temperature polydomain nematic states. They show no appreciable difference in the equilibrium properties such as transition temperature and swelling degree. In contrast, their transition behaviors are significantly different: The transition in I-PLCE occurs sharply at a critical stress whereas that in N-PLCE proceeds gradually over a wide range of stress.

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