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Soft and Ultra-soft Elastomers[1] WILLIAM DANIEL, Univ of NC - Chapel Hill, JOANNA BURDYNSKA, Carnegie Mellon University, SAM KIRBY[2], Univ of NC - Chapel Hill, YANG ZHOU, Kunming University of Science and Technology, KRZYSZTOF MATYJASZEWSKI, Carnegie Mellon University, MICHAEL RUBINSTEIN, SERGEI SHEIKO, Univ of NC - Chapel Hill, UNC-MIRT TEAM[3]
— Polymeric networks are attractive engineering materials utilized for various mechanically demanding applications. As such, much attention has been paid to reinforcement of polymer mechanical properties with little interest in how to make softer elastomers to address numerous biomedical applications including implants and cell differentiation. Without swelling in a solvent, it is challenging to obtain materials with a modulus below ca.105 Pa, which is dictated by chain entanglements. Here we present two methodologies for the creation of soft and ultra-soft dry elastomeric compounds. The first method utilizes polymer capsules as temperature responsive filler. Depending on volume fraction of microcapsules this method is capable of fine tuning modulus within an order of magnitude. The second technique uses the densely grafted molecular brush architecture to create solvent-free polymer melts and elastomers with plateau moduli in the range one hundred to ten hundred Pa. Such compounds may find uses in biomedical applications including reconstructive surgery and cell differentiation.

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