

Abstract Submitted
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Work of adhesion and separation between soft elastomers¹ NANSHU LU, University of Texas at Austin — The JKR (Johnson-Kendall-Roberts) method is widely used to measure the work of adhesion between soft materials. In this paper, the JKR theory is summarized and three dimensionless parameters are proposed to design a proper JKR experiment. The work of adhesion and the work of separation between two commonly used soft elastomers PDMS (Sylgard 184) and Ecoflex 0300 are obtained with the measured pull-in and pull-off forces using a dynamical mechanical analyzer (DMA). The effect of crosslinking density and solvent extraction are examined. It is found that the pull-in adhesion stays more or less constant for all contact pairs we measured. While the effect of crosslinking density is not significant for pristine PDMS, it is very obvious that the higher self-adhesion can be found in less crosslinked PDMS after solvent extraction. Such an effect is even more drastic for PDMS-to-Ecoflex adhesion. A unified adhesion mechanism is proposed to explain these complex adhesion behaviors. It is concluded that the chain-matrix interaction is the most effective adhesion mechanism compared to chain-chain or matrix-matrix interactions and the three interactions are exclusive to each other.

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Nanshu Lu
University of Texas at Austin

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