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Mechanical Interactions in Interpenetrating Composites

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Interpenetrating composites are an advanced class of engineering materials where two continuous phases form complex three dimensional interconnected networks. In contrast to traditional composites they can exhibit a variety of advantages such as isotropy and improved coherence between the constituents. In this work the advantages of soft interpenetrating composites made from polymers are explored. A strong interaction between the two phases is found, increasing the compressive modulus of the composite by at least a factor of 2 compared to the unfilled matrix. This increase in stiffness is found in all directions. An additional anisotropy can be introduced by compression of the foam like framework structure prior to infiltration of the soft silicone matrix. Tailoring the stiffness in such a way has promising applications e.g. in artificial cartilage.