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Bicontinuous networks of metal and elastomer for shape morphing composites

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BICONTINUOUS NETWORKS OF METAL AND ELASTOMER FOR SHAPE MORPHING COMPOSITES

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A composite of two entangled foams—silicone and a low melting temperature eutectic metal alloy will be presented. At room temperature, the material is stiff and thin sections (~1cm) can handle loads in bending excess of 0.5 kg. Above 60^{o}C, the melting temperature of the metal (T_m), the composite is rubbery and can undergo large deformation according to the properties of the elastomer foam. We have demonstrated this change in mechanical properties using standard mechanical testing techniques. Exploiting the dramatic tunability in stiffness, we have demonstrated that this material can: 1) vary in stiffness dramatically 1) take on multiple configurations, 2) be preprogrammed with shape memory, 3) heal with application of heat, and 4) be assembled into larger continuous structures from smaller sub-components.