Granular Elastomers for 3D Printing Applications

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The rising interest in the field of soft robotics demands for elastic soft materials whose mechanical properties can be locally varied to design materials that can deform in a pre-defined fashion while bearing significant loads. Such materials have the potential to enable the design of a soft robot that possesses high dexterity, can interact safely with humans and adapt itself to different environments. The stiffness-toughness compromise inherent to elastomers can, at least in parts, be addressed if they are formulated as multi-network materials.[1] However, the elastomeric liquid precursors are difficult to process, limiting the complexity of shapes they can be processed into. The involved processing of a second network further reduces the shape control and hence applications of these elastomers.[2]

In my poster, I will present a strategy to 3D print elastomers with a high spatial resolution. This is achieved by loading elastomer-based microparticles with a precursor solution. I will discuss how the composition and microstructure of the 3D-printed elastomers influence their mechanical properties.

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[2] Creton, C. 50th Anniversary Perspective: Networks and Gels: Soft but Dynamic and Tough. *Macromolecules*, **2017**, 50, 8297–8316.
[3] Hirsch, M., Charlet, A. & Amstad, E. 3D Printing of Strong and Tough Double Network Granular Hydrogels. *Adv. Funct. Mater.* **2021**, 31, 2005929.