



Chemical Engineering Spring 2023 Seminar Series

Mucus, Gels, Coacervates, and other "Sticky" Associative Polymers



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66-110
3:00-4:00pm
2:45pm Reception

Polymer networks are complex systems of components connected by physical and chemical associations, presenting an opportunity to exert molecular-level control of the network connectivity and macroscopic material properties. In particular, polymers linked by reversible associations form the basis of many synthetic and biological systems and are an evolving class of materials exhibiting promising properties attributed to their dynamic nature. Most reversible cross-links are formed by attractive short-ranged physical interactions, attributable to a variety of different non-covalent interactions. In developing a general description for such associative polymers, I will highlight how control of the sticker bonds enables self-assembled structures on multiple scales from the single-chain to the macroscopic fluid. Pulmonary mucus will be used as a case study, wherein understanding the structural organization and resultant mechanical properties of mucus in the airway illustrates how sticky polymers associate intra- and inter-molecularly both in the bulk fluid and at interfaces. Further understanding how to modulate these associations provides design rules for developing new materials and therapeutic approaches.

<http://cheme.mit.edu/seminar-series/>