

Synthesis of Model Dynamic Covalent Bond-Based Macromolecular Architectures: Linear, Stars, Networks (Vitrimers)

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This lecture introduces the synthesis and fundamental principles behind model macromolecular architectures, linear, star-shaped, and network polymers, based on dynamic covalent bonds (DCBs), with a focus on vitrimers. Emphasis is placed on the use of anionic polymerization and high-vacuum techniques to create well-defined precursors, enabling precise structure-property investigations.

Topics Covered:

- Model Polymers: Definition and importance of model systems.
- Anionic Polymerization – High-Vacuum Techniques: Synthesis of α,ω -functionalized polymers.
- Dynamic Covalent Bonds (DCBs): Imine, boronic ester, and other reversible bonds.
- Macromolecular Architectures: Design and synthesis of DCB-based linear, multi-arm star, and cross-linked networks; vitrimer formation from functionalized polymers.
- Characterization Techniques: SEC, FT-IR, NMR (solution and solid-state), DSC, TGA, DMA, rheology; swelling and sol fraction analysis.
- Chemical Stability