# NEXT-GENERATION BLOCK POLYMERS FROM RENEWABLE RESOURCES

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Sustainable block polymers hold much promise as tomorrow's advanced macromolecular materials. In this presentation I will describe our work aimed at the development of next-generation sustainable polymers that (i) can be produced from renewable resources on large scale, (ii) can be incorporated in block polymers with precision control over molar mass and composition, and (iii) exhibit properties that can outperform traditional petroleum derived materials from a combined environmental and mechanical property perspective. Key to the success of this strategy was the development of a biosynthetic pathway to a methyl-substituted valerolactone in collaboration with a team of metabolic engineers and its subsequent controlled incorporation in triblock polymers and polyurethanes in collaboration with a team of materials scientists. This comprehensive strategy offers an economically viable approach to both sustainable elastomers and plastics for a broad range of applications. I will describe background work that enabled this discovery, the initial efforts focused on beta methyl valerolactone, incorporation of this new biorenewable feedstock into chemically recyclable polyurethanes and highlights from a comprehensive studied aimed at uncovering key design principles associated with the development of aliphatic polyester block polymers. I will end the presentation with new, related efforts coming from the Center for Sustainable Polymers (csp.umn.edu).