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Use of soy protein and oil as feedstocks for valuable renewable polymer materials  
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The two major ingredients of soybean, protein (SP) and oil (SO), are not only important food ingredients but also valuable feedstocks for industrial products. In this presentation, we introduce some of our recent progress in utilizing SP and SO for polymer materials. In one effort, the SP-poly(acrylic acid) (PAA) superabsorbent hydrogel was synthesized from SPI and potassium acrylate. Alkali-treated SPI was turned into macro monomer through the functionalization of its primary amine groups using methacrylic anhydride. It was demonstrated that the SP macro monomer acted as a macro-cross linker and no additional cross linker was needed. The whole synthesis was conducted in a one-pot process. As a result of the functionalization of SP, gel content and compressive gel strength was significantly increased and extractable SP was reduced. The SP-PAA hydrogels displayed a stable swelling performance in buffer solutions with pH ranging from 6 to 11.5.

In another effort, a novel efficient one-step method for preparation of acrylated soybean oil (ASO) was introduced. ASO was obtained by reacting soybean oil (SO) and acrylic acid (AA) directly under catalysis. <sup>1</sup>H NMR analysis indicated that the number of acrylate groups could reach 3.09 per triglyceride molecule or the conversion of the double bonds was up to ~75.7%. Copolymerization of the ASO and styrene was demonstrated, and the flexural and dynamic mechanical properties of the resulting polymers were evaluated.