Compatibilization of Polymer Blends

VTIP 18-101: "Multiblock Copolymers of Polysaccharides and Synthetic Polymers and Their Use in Compatibilizing Polymer Blends"

THE CHALLENGE

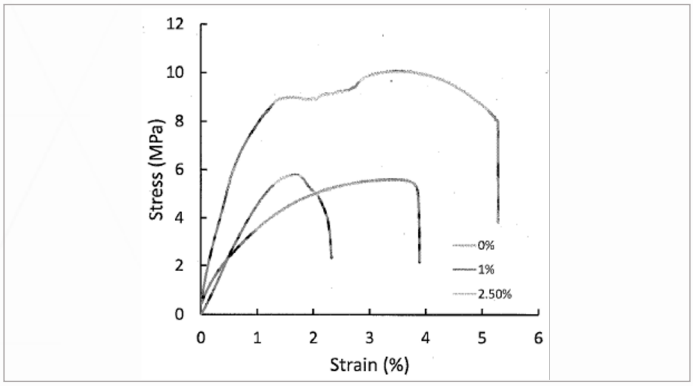
Most polymer combinations do not mix well. They phase-separate, creating large domains of homopolymers with weak interfaces between them. This problem can be solved through the use of compatibilizers – copolymers of the two homopolymers that can bridge the interfaces and enhance the strength of the blend. Few compatibilizers exist for polysaccharide-based polymers due to synthetic difficulties in making copolymers.

OUR SOLUTION

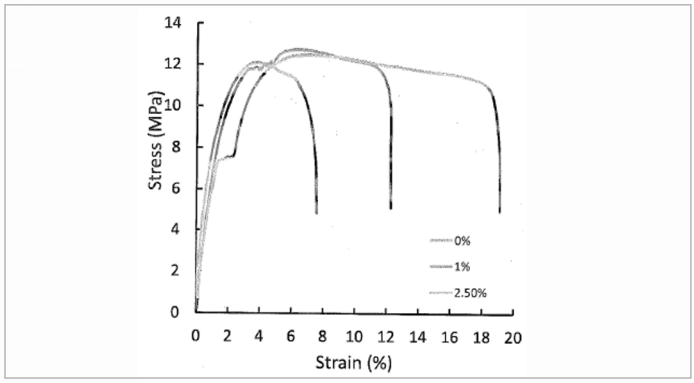
Researchers at Virginia Tech have developed a novel method to make copolymers based on polysaccharides and various synthetic polymers. These copolymers are then used at low concentrations to compatibilize blends between renewable, polysaccharide-based, and synthetic polymers. The compatibilized polymer blends combine the desirable characteristics of the polysaccharide and synthetic components of which they are made up.

Benefits of the new materials include:

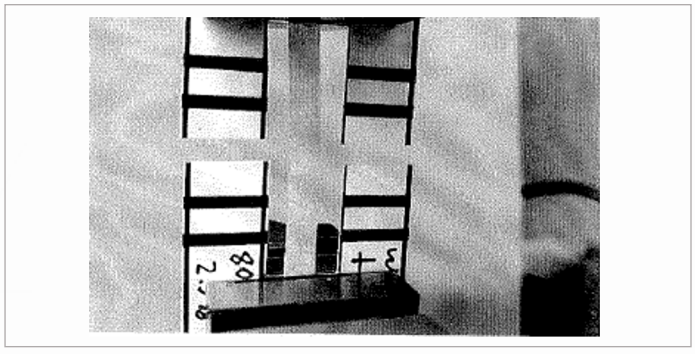
- Enhanced mechanical properties and physical mixing.
- Strength of polysaccharide of cellulose-based polymers and toughness of synthetic polymers.
- Various potential applications including packaging, optical films, or any other applications were tough film is required.



Compatibilization of 50:50 blends increases modulus from 820 MPa to 1200 Mpa and strain at break from 2% to 5%.



Compatibilization of 80:20 blends increases strain at break from 7% to 19% without affecting modulus.



80:20 blend photographed in the lab during tensile testing.

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