Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M22-142P^
Published: 7/27/2023

Inventors

Elham Fini

Masoumeh Mousavi

Contact

Physical Sciences Team

Organosulfur

Background

Conventional methods of sulfur polymerization suffer from limitations such as polymer instability and the need for high temperatures and extended heating periods. Additionally, the catalysts used in traditional sulfur vulcanization, such as zinc oxide, have adverse effects on the environments, especially aquatic organisms. There is a need for methods of creating sulfur-based polymers that are more sustainable and have improved functional properties.

Invention Description

Researchers at Arizona State University have developed inverse vulcanization, a novel method to create sulfur-based polymers. By utilizing magnesium oxide and oleic acid as catalysts, the researchers achieved the polymerization of sulfur and fatty acids, resulting in biodegradable polymers with enhanced functionality and recyclability. This innovative approach addresses the limitations of traditional sulfur vulcanization methods, which produce unstable polymers that readily depolymerize. The use of environmentally friendly catalysts and sustainable precursors, such as oleic acid derived from biomass waste, ensures a positive environmental impact. The developed sulfur-based polymers exhibit improved properties, including reduced crystallization, lower polymerization temperatures, and the potential to replace existing composites.

Potential Applications

- Stand-alone adhesives
- Coatings
- Construction material
- Biodegradable packaging
- Biomedical applications
- Electronics and electrical industry

Benefits and Advantages

- Enhanced functionality
- Potential cost-performance advantage
- Sustainable precursor
- Reduced environmental impact
- Lower polymerization temperature

Related Publication: Sustainability Implications of Regenerative Sulfur Blooms in Bituminous Composites

Related Publication: Turning Two Waste Streams into One Solution for Enhancing Sustainability of the Built Environment