

STYRENATED SOYBEAN OIL DERIVATIVES AS A REPLACEMENT FOR NAPHTHENIC AND AROMATIC RUBBER PROCESSING OILS (RFT-512, 513)

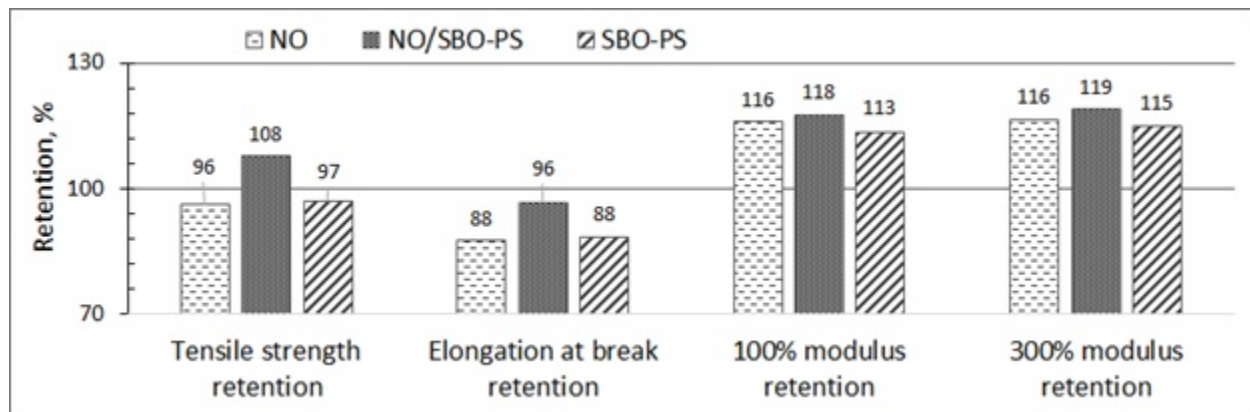
Technology:

RFT-512: The technology includes styrenated plant oils, styrenated plant oil-based polyesters, and styrenated plant oil-based poly(vinyl ethers) for use as processing aids for rubber compounds. It also includes the methods for producing the styrenated compounds and rubber materials.

RFT-513: The technology includes rubber compounds incorporating sucrose fatty acid esters or poly(vinyl ether) fatty acid esters that contain plant oil-derived fatty acids in addition to the methods of making and using the compounds.

Invention Summary:

Scientists at NDSU have developed styrenated soybean oil derivatives that can be used as a direct replacement for naphthenic and aromatic oils in rubber processing. A particularly promising derivative is soybean oil (SBO) modified with polystyrene (SBO-PS). Tests using this bio-based rubber processing oil produced rubber with improved wet and ice traction with preserved low rolling resistance, while also providing better tensile properties, and similar durometer hardness and tear resistance, as compared with naphthenic and aromatic oils. These results demonstrate that non-toxic soybean oil derivatives can provide high performing alternatives to the more toxic naphthenic and aromatic oils that are currently used for rubber processing. See for example the figure below, comparing naphthenic oil (NO), SBO-PS, and a 50/50 mixture of the two.



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Benefits:

- Improved wet and ice traction
- Very similar rolling resistance
- Increased tensile strength and elongation
- No difference in tear resistance or hardness
- No additional curatives needed
- Eco-friendly with low toxicity
- Utilizes widely available materials

Patents:

This technology is Patent pending in the US ([2019/002697](#)) and South Korea ([KR20180118624](#)), and is available for licensing/partnering opportunities.

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