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Biomaterials: An Opportunity for More Sustainable Bitumen Pavement Systems

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Abstract

Like many other industries, the asphalt paving industry is working to become more sustainable. There have been many innovations such as the use of a bio-oil as an asphalt replacement, several natural oils have been used as a rejuvenator, and recently polymers have been created from non-food sourced vegetable oil. The use of vegetable oils not only provides sustainability by using renewable feedstock for additives, but also allows the use of more reclaimed asphalt pavement (RAP) in new pavements or the use of lower quality stiff asphalt such as vacuum tower bottoms (VTB). The researchers at Iowa State University (ISU) have identified and/or created several novel soybean derived additives including epoxidized methyl soyate (EMS), sub-epoxidized soybean oil (SESO), poly(acrylated epoxidized soybean oil) (PAESO), and BioMAG.

The development of these new molecules has enabled the research team to create formulations for high RAP mixes, stiff asphalt binders from refiners, and water-based emulsions for fog seals, seal coats and cold in-place recycling.