



## Carbon Black Replacement

According to the International Carbon Black Association, **carbon black** is virtually pure elemental carbon in the form of colloidal particles that are produced by incomplete combustion or thermal decomposition of gaseous or liquid hydrocarbons under controlled conditions. It was traditionally used as a reinforcing agent in tires but its uses have broadened to include plastics, electrostatic discharge compounds, pigments, and printing. If biochar could replace all or even part of the carbon black then the reliance on fossil-produced carbon black would be reduced.

Sriraam Chandrasekaran and B.K. Sharma of [ISTC \(Illinois Sustainable Technology Center\)](#) tested biochar to see if it could replace some of the carbon black filler in styrene-butadiene rubber. **Styrene-butadiene rubber** is a family of synthetic rubber derived from styrene and butadiene and is used in a variety of products such as automobile tires, children's toys, shoe soles, and chewing gum.

They produced biochar using slow pyrolysis from birchwood feedstock, which contained 89% carbon and <2% ash. Composites made from blended fillers of 25% biochar/75% carbon black were equivalent to or superior to their 100% carbon black analogs in terms of tensile strength and toughness at all filler concentrations (10%, 20%, 30% and 40%). Composites made with 50% biochar/50% carbon black were equivalent to or superior to 100% carbon black composites in tensile strength, elongation, and toughness properties at total filler concentrations up to 30%, but not at the 40% filler concentration.

Their results demonstrate the high potential to use renewable birchwood biochar to replace up to half the carbon black in certain styrene-butadiene rubber composites.



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### Meet the Scientists

- Sriraam Chandrasekaran
- B.K. Sharma

### Publications

- Birchwood biochar as partial carbon black replacement in styrene-butadiene rubber composites



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