



Announcement

American Process Inc. and Birla Carbon Announce Joint Development Agreement for Combining Nanocellulose and Carbon Black in Tires

- *Materials scientists at American Process Inc. and Aditya Birla Group's, Birla Carbon aim to improve the fuel efficiency of tires by combining carbon black and nanocellulose*
- Low rolling resistance tread material is a key technology development focus area of Birla Carbon's Sustainability strategy

March 2, 2017, Atlanta, GA - American Process Inc. (API) (Atlanta, GA) and Aditya Birla Group's, Birla Carbon (Marietta, GA) recently signed a Joint Development Agreement to further explore the technical and business potential of combining carbon black and nanocellulose to improve the performance and sustainability profile of tires. Initial evaluations suggest synergies between the companies' Birla Carbon® and BioPlus® nanocellulose products to significantly lower the rolling resistance of tires. Research indicates that up to 20% of a vehicle's fuel efficiency is impacted by the rolling resistance of tires. Increased commercialization of low rolling resistance tread material is a key technology development focus area identified in Birla Carbon's 2016 Sustainability Report.

Over 70% of the world's carbon black is consumed by the tire industry, with carbon black constituting 25% of the tire weight. Within the tire industry, there are ever-increasing demands to improve rolling resistance, traction and fuel economy while maintaining tire safety and affordability. In addition, with growing populations, economies, and mobility throughout the world, the industry must ensure that technology developments are sustainable and environmentally friendly.

Charles Herd, PhD, Director of Birla Carbon's Rubber Black Technology, comments, "Low rolling resistance has been and has become an ever increasing area of investment and technological development for tire manufacturers in all aspects of tire technology including design, construction and materials. The synergies between carbon black and nanocellulose offer an exciting opportunity to meet the performance and environmental demands placed on us as a responsible manufacturing entity in a global society."

According to Theodora Retsina, PhD, CEO of American Process Inc., "In addition to its exceptional sustainability profile, nanocellulose offers tremendous performance improvements for a variety of materials applications including rubber. With strength equivalent to carbon fiber, nanocellulose can improve the strength, durability, and



toughness of composites. It also shows unique synergistic effects with other filler materials like carbon black in improving composite performance.”

Kim Nelson, PhD, API’s VP of Nanocellulose remarks, “This partnership has many synergies including Birla Carbon’s technical expertise, rigorous and disciplined development program, and world-class research facility in Marietta, Georgia. Our ability to offer large-scale quantities of a variety of nanocellulose products with various particle sizes and surface chemistries also enhances the development process.”

About American Process Inc.

API is a bio refinery technology firm focused on industrial scale-up of production technologies for renewable materials, fuels and chemicals from biomass. API has developed two distinct nanocellulose production processes, BioPlus® (for various end-uses including reinforcement of plastics and rubber) and BioPlus GreenBox+® (for brown packaging and plastics reinforcement) that are both demonstrated at the ½ ton per day scale at their Thomaston Biorefinery in Georgia.

Nanocellulose is a versatile high-strength, light-weight renewable biomaterial that Thomson Reuters named as one of the top 10 technologies that will change the world by 2025. API has been granted seven patents and has over 100 patents pending in the nanocellulose field. API estimates the near-term global market size for nanocellulose to be 3.7 million tons per year.

About Birla Carbon

Birla Carbon is one of the world's largest manufacturers and suppliers of high quality Carbon Black and a flagship business of the US\$ 41 billion Aditya Birla Group. Birla Carbon’s footprint extends across 12 countries with 16 manufacturing facilities. The company provides a complete portfolio of products across ASTM grades and specialty blacks to meet the specific end requirements across Tires, Rubber, Plastics, Coatings, Inks and other niche industries. Birla Carbon has two state-of-the art technology centers at Marietta (USA) and Taloja (India), besides well-equipped laboratories across its manufacturing units providing for continuous R&D. As an ardent practitioner of sustainable development, Birla Carbon’s Sustainable Operational Excellence (SOE) strategy focuses on employee safety, environmental stewardship, efficient use of carbon sources and conducting operations in a socially and ethically responsible manner. For more information, visit: www.birlacarbon.com

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