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Materials at 200 mph: Making NASCAR Faster and Safer

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You cannot win a NASCAR race without understanding science.¹ Materials play important roles in improving performance, as well as ensuring safety. On the performance side, NASCAR limits the materials race car scientists and engineers can use to limit ownership costs. ‘Exotic metals’ are not allowed, so controlling microstructure and nanostructure are important tools. Compacted Graphite Iron, a cast iron in which magnesium additions produce interlocking microscale graphite reinforcements, makes engine blocks stronger and lighter. NASCAR’s new car design employs a composite called TegrissTM that has 70 percent of the strength of carbon fiber composites at about 10 percent of the cost. The most important role of materials in racing is safety. Drivers wear firesuits made of polymers that carbonize (providing thermal protection) and expand (reducing oxygen access) when heated. Catalytic materials originally developed for space-based CO₂ lasers filter air for drivers during races. Although materials help cars go fast, they also help cars slow down safely—important because the kinetic energy of a race car going 180 mph is nine times greater than that of a passenger car going 60 mph. Energy-absorbing foams in the cars and on the tracks control energy dissipation during accidents. To say that most NASCAR fans (and there are estimated to be 75 million of them) are passionate about their sport is an understatement. NASCAR fans understand that science and engineering are integral to keeping their drivers safe and helping their teams win. Their passion for racing gives us a great opportunity to share our passion for science with them. NASCAR[®] is a registered trademark of the National Association for Stock Car Auto Racing, Inc. TegrissTM is a trademark of Milliken & Company.

¹Diandra Leslie-Pelecky, *The Physics of NASCAR* (Dutton, New York City, 2008).