Boston University Physics Colloquium

Materials at 200 MPH:
Making NASCAR Faster and Safer

You cannot win a NASCAR race without understanding science.[1] Materials play important roles in improving performance, but also in 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 in producing materials that maximize strength while minimizing weight. 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 an innovative polymer composite called TegrisTM in the splitter. This composite can replace significantly more expensive carbon-fiber composites in many applications.

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 availability) when heated. Catalytic materials originally developed for space-based CO_2 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 direct energy dissipation away from the driver during accidents.

NASCAR fans–and there are about 75 million of them–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 materials science and engineering with them.

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

Diandra Leslie-Pelecky
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March 22, 2011 (Tuesday) at 3:30pm (Refreshments at 3:15pm)
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