TIP Project Brief – 090027/10H002

Manufacturing
Functionalized Nano Graphene for Next-Generation Nano-Enhanced Products

Develop processes for mass-producing chemically modified ("functionalized") nano graphene for next-generation products, particularly for the energy industries.

Sponsor: Angstron Materials, LLC
Dayton, OH

- Project Performance Period: 2/1/2010 - 1/31/2013
- Total project (est.): $2,988 K
- Requested TIP funds: $1,494 K

Angstron Materials, a world leader in the production of nano graphene platelets (NGPs), is developing a process for modifying the tiny flakes of graphene by attaching tailored molecules to their surfaces to match them to specific applications, a process called chemical functionalization. Despite the press carbon nanotubes tend to receive, graphene may prove to be even more important. Graphene, carbon in the form of a flat sheet of hexagonally arranged atoms, has been shown to have striking material properties; among other things, it has the highest intrinsic strength and the highest thermal conductivity of all existing materials as well as exceptional in-plane electrical conductivity and electron mobility that is 100 times faster than silicon. In addition, it is far cheaper to make than nanotubes. Nano graphene platelets are being investigated as critical ingredients in several energy storage and conversion products, such as high-capacity lithium-ion batteries, high-capacity supercapacitors, fuel cells, wind turbine blades, lubricants and solar cells. The ability to modify graphene platelets in a continuous, cost-effective manner is the next step to broad implementation of this high performing material in next-generation nano-enhanced products. To realize this capability and explore other exciting possibilities for new manufacturing solutions, Angstron's project goals will focus on two primary objectives at the leading edge of graphene science and technology. The company will develop methods for mass-producing functionalized nano graphene platelets through the development of scalable surface treatment procedures for both pristine graphene and graphene oxide platelets. Angstron will also develop an in-depth understanding of the relationships between processing, shape and structure changes and performance in nano graphene platelets and devices or composites that include them for both functional and load-bearing applications. Angstron's work will also support the use of nano graphene platelets in thin films or coatings (for EMI shielding, electrostatic spray painting, and conductive adhesive),composites and thermal management applications.

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