TIP Project Brief – 090175/10H012

Manufacturing
Development and Scale-Up of Nanocomposites with Sub-10nm Particles

Develop new processes and technologies for scaling up the production of high quality nanocomposites, by incorporating nanocrystals with precisely controlled size, shape, and surface chemistry into a polymer matrix for demanding and high-volume industrial applications.

Sponsor: Pixelligent Technologies, LLC
College Park , MD

- Project Performance Period: 2/1/2010 - 1/31/2013
- Total project (est.): $8,178 K
- Requested TIP funds: $4,089 K

A research joint venture led by Pixelligent Technologies, LLC, partnered with Brewer Science, Inc., is developing new processes and technologies to scale up the production of high-quality nanocomposites—nanocrystals dispersed in polymers—to create materials with enhanced performance and new functionality that cannot be provided by polymers or traditional composites. Their initial target applications are new materials for the optoelectronics and semiconductor industries. Adding tailored nanocrystals to polymers can result in materials with a broad range of enhanced properties, depending on the combination. Polymer nanocomposites can be designed that are tougher, stronger, stiffer, more heat resistant, better conducting, more fire-resistant, more chemical resistant and more biocompatible. Although many nanocomposites have shown great promise at the laboratory scale, commercialization has lagged, in part because of the inability to produce these materials on an industrial scale while maintaining their quality and functionality. Working with Brewer Science, a company with expertise in polymers for industrial applications, Pixelligent aims to scale their production of high-quality metal oxide nanoparticles from grams to kilograms while maintaining their ability to control the size and shape of the particles within narrow ranges, and prevent them from clumping together, a common problem with nanoparticles. Their two target applications are novel polymer nanocomposites, one with a high index of light refraction and other necessary properties for use in high-efficiency light-emitting diodes (LEDs), and the other a novel microlithographic layer for semiconductor processing that can be used in thinner coatings to support next-generation levels of microcircuit lithography. If successful, the basic nanocomposite processing advances developed in this project should extend to a wide range of nanocomposite materials.

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Active Project Members

- Brewer Science, Inc. (Rolla , MO)
  [Original, Active JV Member]
- Pixelligent Technologies, LLC (College Park , MD)
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