# Looking for the killer nano app

NANO ENHANCERS for PLASTICS CONFERENCE 2012
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Nano materials have the potential to expand the uses of plastics because of the possibility of creating more functionality and versatility. Speakers at the Nano Enhancers for Plastics conference, organised by *European Plastics News*, discussed the key challenges for nano materials in finding the applications that will spark massive commercialisation. **John Osborne** reports

For some time industry has known how to create nano materials. Russian scientists did some work on carbon nanotubes, also known as CNTs, in the early 1950s but because of Soviet secrecy the research results were not widely known. Work was also done in Japan in the early 1970s.

However, possibly the most exciting area of nanotubes nowadays is how they are transforming smart materials. CNTs have many qualities that are virtually untapped and it is becoming possible to combine those properties to create substances that can do far more than the most expensive alloy, as well as exceed most people's expectations of composites.

Nano enhancers are also altering the way we view integration. In the past this was simply a way of putting a function into a component so that the finished part could perform another purpose.

Now, because it is easier to apply functionality to layers of polymers barely microns thick, scientists can create products that interact with the environments in which they are placed.

## CNT TARGETS

Dr Peter Krüger, head of the nanotechnology working group at Bayer MaterialScience, presented the first paper at the conference, saying that CNTs can improve energy storage in Li-ion batteries, convert wind energy more effectively, and even transport of heat. But CNTs' properties will only be exploited if they can more cost effectively be incorporated into mass market products such as textiles, jackets, and carpets, he said.


**Nokia Research Centre is investigating graphene's potential**

Dr Isabel De Schrijver, who works for Centexbel, the Belgian Textile Research Centre, presented a paper about carbon nanotubes and coatings in smart textile applications. She explained that it is possible to incorporate nanofunctionality into textile yarns, creating nanocomposites that are superior to the additives that are currently applied.

She believes that by making use of properties such as the high electrical conductivity of CNTs it will be possible to create carpets that could, for example, detect when an elderly person alone in a house has fallen over. Conventional telemedicine sensors often rely on wearer intervention such as pressing a button, a task that an unconscious person could not do. However, smart materials with more sensitive and responsive plastics could automatically summon help.

## TAILORED PLASTICS

Greater use of graphene could also enable better consumer products. Dr Jani Kivioja is a Research Leader in the nanosensing area of the Nokia Research Centre in Cambridge, the UK. He said consumers go for aesthetics and appearance rather than technical performance when buying a mobile phone and manufacturers can use graphene for plasticity greater than can be achieved with silicon, glass and metals.

Kivioja believes that graphene is the nano enhancer which will enable scientists to create tailored plastics. He said it has many desirable qualities including being the thinnest imaginable material, the stiffest known material and the most stretchable crystal (as it has 20% more elasticity).

Greater use of CNTs and graphene may enable truly multi-functional smart plastics to be developed.

However, speakers at the conference warned that production costs will have to fall considerably or demand will have to soar for them to be viable in mass produced consumer goods. ■