UOW researchers develop 'bullet proof' graphene

UOW researchers have used graphene to develop a new composite material which can produce the toughest fibres to date- even tougher than spider silk and Kevlar!

Graphene, the latest discovery in the nano world of carbon, has proven to be an amazing building block for advanced materials. The new graphene composite can be wet-spun into fibres with potential applications in bullet-proof vests and reinforcements for advanced composite materials.

As published today in Nature Communications, researchers from the UOW-based Centre of Excellence for Electromaterials Science (ACES) have shown that graphene can work just as carbon nanotubes, a more common toughening agent, in polymer composites. It is also a much cheaper material and can be produced easily in large quantities.

ACES Senior Researcher and paper co-author Professor Geoff Spinks said the ratio of grapheme to carbon nanotubes was a key factor in the development of the composite.

"Quite surprisingly, we found that a 'magic mixture' of equal parts carbon nanotubes and graphene added to the polymer gave exceptionally high toughness," he said.

"Fibres made from other combinations of these materials were not especially tough at all."

Professor Spinks explained that the super tough fibres can be produced easily by a wet-spinning method and can be readily up-scaled. In this case, fibres were spun by collaborators at the Centre for Bio-Artificial Muscle at Hanyang University, Korea.

ACES Executive Research Director Professor Gordon Wallace said such international collaborations were critical for effective and efficient progress at the cutting edge of science.

"This particular project benefitted from the supply of the graphene building blocks using a process invented here in Australia and further developed using the skills and facilities available through the Australian National Fabrication Facility- Materials node," he said.

The team has also supplied graphene materials to other research activities in the USA, Korea and France.

By: Natalie Foxon, ACES.