

# Carbon nanotubes could go antiballistic

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CSIRO (Australia) has been granted \$2 million under the Defence Capability and Technology Demonstrator (CTD) Program to demonstrate the capabilities of carbon nanotubes as strong, lightweight antiballistic materials.

Principal Research Scientist with CSIRO Textile and Fibre Technology, Dr Stephen Hawkins, says currently available body armour is typically heavy, stiff and hot to wear.

“Generations of polymers and ceramics have been developed to keep pace with the threat and lessen the burden of the armour but now a new material – carbon nanotubes or CNTs – is set to move ballistic protection into new territory,” he says.

CSIRO’s Carbon Nanotubes for Ballistic Protection project was one of eight selected as part of the latest round of Defence CTD Program funding announced last night.

Dr Hawkins says CNTs are amongst the first of the new wave of nano-structured materials and offer extraordinary properties of strength, stiffness and lightness.

“The challenge is to capture the potential of these new materials at the macro level. CNTs are fibres of pure carbon that are only 1 to 100 nanometres in diameter but up to millimetres in length. Synthesising and manipulating these myriad tiny fibres into ordered structures requires a combination of novel processing skills coupled with a fundamental understanding of fibre behaviour, Dr Hawkins said.

“To give a sense of scale, a human hair is typically 100 microns, or 100,000 nanometres in diameter. If hair had the same proportions as nanotubes, it would be from tens to hundreds of metres long, with a great capacity for tangling!”

CSIRO Textile and Fibre Technology has established a capability to produce very highly specified CNTs with the unique characteristic of

being able to be drawn directly into yarn. This in combination with other advanced materials will form the basis of the new antiballistic structures.

“No single material has all of the properties required for ballistic protection, so a successful application of CNTs would see them as part of an integrated system with greater strength and flexibility and reduced weight,” Dr. Hawkins says.

Chief Defence Scientist, Dr Roger Lough, announced the funding at the annual Capability and Technology Program Dinner held in Canberra.

Source: CSIRO

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