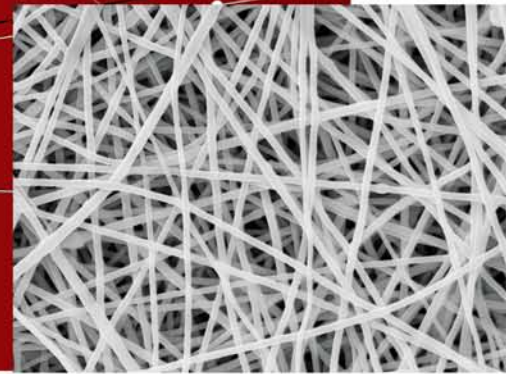


**'It's a very attractive and versatile material with enormous applications.'**



An electron micrograph showing the structure of nanofibres

## STRONG ENOUGH FOR SPIDERMAN?

"Man-made 'nano spider silk' could soon be as strong as the real thing," says Deakin University post-doc Minoo Naebe.

The man-made polymer fibre is 'spun' in a process that uses a strong electric field to draw the fibres out into long strands with a diameter of just a few millionths of a millimetre.

Nano 'spider silk' can be made using a variety of different polymers. And there are dozens of potential applications for the fibres: from toughening aerospace components without adding much weight, to providing protective clothing against biological and chemical attack.

"It's a very attractive and versatile material with enormous applications," says Minoo. "One of the most desirable applications is likely to be in polymer composite materials which are used to make lightweight casings for our mobile phones and notebook computers, as well as lightweight aircraft and car bodies, and even spacecraft."

During her PhD research under Dr Tong Lin and Professor Xungai Wang at the Centre for Material and Fibre Innovation, Minoo showed that adding carbon nanotubes, a tubular form of carbon structurally similar to graphite, to the fibres can dramatically enhance their strength. The tiny nanotubes, only a few nanometres in diameter but up to a few millimetres long, are one of the strongest materials yet discovered and they can conduct both heat and electricity.

"We add the nanotubes into our polymer solution before electrospinning it to create a composite nanofibre," Minoo explains. "We have found that the properties of the nanofibre depend on how the polymer interacts with the nanotubes – the more the polymer crystallises around the nanotubes, the stronger the resulting fibres are."

Furthermore, Minoo has discovered that a simple post-spinning treatment can increase the 'crystallinity' of the polymer in the fibre. The treatment depends on the polymer used – for example, if polyvinyl alcohol (PVA) is used, a simple dip in methanol is all that is needed to improve the fibre's tensile strength.



Nanofibres can be used to produce a strong fabric with many applications

### FURTHER INFORMATION:

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