

## Scots team weaves way to stronger plastics

**CHRISTINE LAVELLE**

WEAVING threads of atoms into star-shapes could produce lighter, stronger plastics, Scottish scientists have found.

Researchers at the University of Edinburgh have managed to tie molecules into complex knots they say could give materials "exceptional versatility".

Working on the nanoscale, which is 80,000 times smaller than a hair's breadth, the team have woven threads of atoms into the shape of five-point stars, creating building blocks of materials which are flexible and potentially shock absorbent.

Each of the atom threads tied together is 160 atoms in length and measures a 16-millionth of a millimetre. Scientists hope the new molecules, known as pentafoil knots, will mimic the characteristics of complex knots found in proteins and DNA, which help to make some substances elastic.

In natural rubber, 85 per cent of the elasticity is caused by knot-like structures in its molecule chain.

The team, which has been working with researchers from the University of Jyväskylä in Finland, said it is the first time a knot has been created with five crossing points, as until now only the simplest type – a trefoil, with three points – has been achieved by scientists.

They claim that being able to produce materials with a specific number of entanglements, rather than the "random" mixture that occurs in today's plastics and polymers, could allow them to exercise greater control when designing materials.

The research, funded by the Engineering and Physical Sciences Research Council, is published

in *Nature Chemistry* journal.

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