

Slip knot key to creating world's toughest fiber

May 15 2014



(Phys.org) —A new way of making super tough fibres could be realised by a simple knot, according to new research from a materials scientist at Queen Mary University of London.

Publishing in the journal *PLOS ONE*, the paper suggests the new method could make ordinary polymers – large molecules with repeating units - reach unprecedented <u>toughness</u> by adding a <u>knot</u> to absorb additional



energy.

"The simple manoeuvre of adding a slip knot creates a coil of extra length that is resistant when it comes under tension and can dissipate energy thanks to the friction in the knot," said author Nicola Pugno, Professor of Materials Science at Queen Mary's School of Engineering and Materials Science.

Professor Pugno tested three different types of slip knots on commercial polymers such as dyneema and endumax, which are used in fishing lines.

The configuration that allowed for the most toughness was produced with endumax, increasing its toughness from 44 Joules per gram to 1070 Joules per gram, the equivalent of ten times that of Kevlar, which is used in body armour (90 Joules per gram).

Professor Pugno is working on different <u>materials</u> to find suitable knots for industries designing the next generation of super tough materials such as sustainable packaging and medical implants.

Provided by Queen Mary, University of London

Citation: Slip knot key to creating world's toughest fiber (2014, May 15) retrieved 27 April 2024 from <u>https://phys.org/news/2014-05-key-world-toughest-fiber.html</u>

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