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TECHNOLOGY UPDATE

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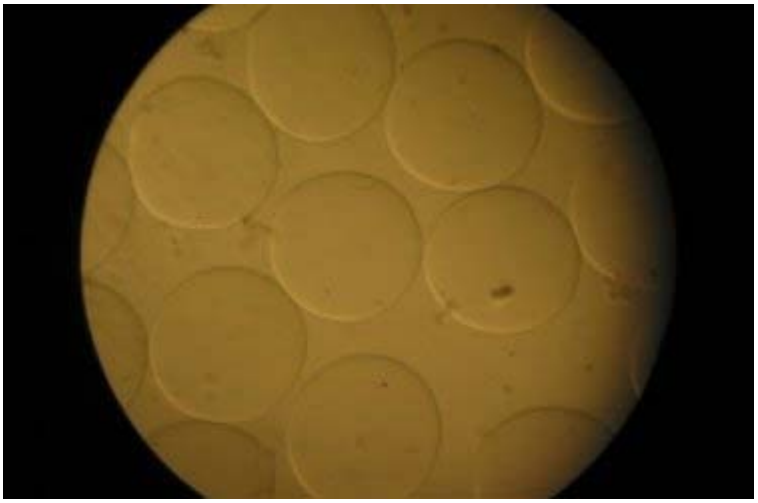
CNT drug carrier gets polymer protection

Carbon nanotubes (CNTs) offer immense potential in the field of biomedicine, specifically as drug-delivery devices. CNTs have been functionalized and loaded with a variety of therapeutic molecules such as drugs, DNA, proteins, antibodies and enzymes. However, stumbling blocks remain and the delivery of therapeutic molecules by carbon nanotubes still presents a major challenge.



Polymeric membrane CNT microcapsule device

To make the process more convenient and efficient, researchers led by Satya Prakash from McGill University, Canada, have developed a novel polymeric membrane microcapsule carbon nanotube (CNT) device for targeted delivery applications. The invention makes use of special features of CNTs and biopolymers, which exhibit gelation properties.

Carbon nanotubes were either embedded in the core or coated on the surface of a polymeric

membrane. A specialized CNT formulation was mixed in a polymeric alginate solution and passed through an encapsulator. The set-up involves the use of a high voltage electrostatic bead generator and calcium chloride solution to form beads of alginate core embedded with nanotubes.

Protective coating

The alginate core with CNTs was further coated with a layer of amino acid poly-L-lysine and alginate to protect the CNTs, functionalized and loaded with therapeutic molecules from external environments until their release at the targeted site. Tests show that nanotubes were successfully incorporated into the core/surface of different types of polymeric membranes to form novel polymeric membrane CNT microcapsules. The formation of polylysine and alginate layers on alginate cores carrying CNTs was also demonstrated.

In addition to providing targeted drug delivery, the device also offers controlled release functionality. Drug release rates can be regulated by modifying the composition of the polymeric membrane to ensure maximum clinical efficacy of the therapeutic molecules at the diseased site.

Researchers

The authors have patented their design and are looking for potential partners for further development and commercialization of their research.

The researchers presented their work in *Nanotechnology* (http://www.iop.org/EJ/abstract/0957-4484/20/2/025612).

About the author

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