TECHNOLOGY

Method to Synthesize Stable, Self-Assembling Virus-like Nano Rods and Tubes

OVERVIEW

Background
Virus-like nanoparticles (VLPs) are mere envelopes of viruses sans the genetic material that mimic the structure of actual viral particles. The expression of viral structural or capsid proteins can result in the self-assembly of these particles. In essence, they are non-infective virus-like particles that may be derived from different kinds of genetically modified viruses and can be utilized for multiple applications such as nano-templates for electrodes, superhydrophobic surfaces and vaccines. Studies have shown the use of genome free viral capsids as multivalent carriers for delivering anti-cancer drugs like taxol.

Innovative Technology
Researchers at the University of Maryland have developed nano scale VLP rods and tubes by engineering the Tobacco Mosaic Virus. The TMV derived VLP created is a rigid rod or tube consisting of multiple copies of identical capsid subunits (M.W. 17.5kDa) with a ~4nm diameter channel and a ~300nm axis. This high aspect (length to width) ratio enables the viral particle to be ideal for nano templating. In proof-of concept studies, the investigators have demonstrated the metallization of surface assembled VLPs for making high surface area electrodes, and the display of a receptor for the detection of a tag specific antibody. Researchers have also developed a technique to circumvent problems associated with the stability of functionalized virus particles that occur as a result of viral replication or recombination of the genetic material.

APPLICATIONS

· Vaccine development
· Templating for inorganic materials to create nano features such as electrodes
· Templating for nano scale display for receptor molecules for biosensor applications

ADVANTAGES

· Self assembling VLPs are stable under low pH and physiological conditions
· Safer alternative to using a live attenuated virus
· Easily purifiable and reproducible
· Scalable to desirable quantities
· High aspect ratio of the viral particles enables its use as a biologically derived carbon nanotube

CONTACT INFO

UM Ventures
0134 Lee Building
7809 Regents Drive
College Park, MD 20742
Email: umdtechtransfer@umd.edu
Phone: (301) 405-3947 | Fax: (301) 314-9502

Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

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CATEGORIES

- Nanotechnology + Nanoparticles + Nanomaterials
- Vaccines

EXTERNAL RESOURCES

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