

Nanoparticle-polymer complex for sustained release of oral care products

EXECUTIVE SUMMARY

A process for preparation of nanoparticle-polymer multilayer complexes for sustained release of active oral agents, which can anchor and retain on the surface enamel of the teeth, for extended periods of activity.

BACKGROUND

Conventional layer-by-layer preparation scheme for preparing such nanoparticle-polymer multilayer complexes requires excessive use of polyanions and polycations with cumbersome separation process involved.

TECHNOLOGY DESCRIPTION

NCL scientists have developed a process for constructing nanoparticle-polymer complex for sustained release of active agents for oral care (for applications in toothpastes and oral rinses). Polymer multilayers are built up layer by layer on nanoparticles of 5-50 nm, consisting of a water repelling (hydrophobic) shell around a core of multiply (polyanion and polycation) charged material (the core can be of inorganics as silica, titania and/or clay) and encompassing outer layer with an affinity to the tooth enamel.

MARKET POTENTIAL

- The Indian market for oral care products grew to Rs. 3241crores at a growth rate of 14.7% in 2009¹ and the market for US is headed to reach \$8.9 billion by 2012³
- There is a high market demand for novel, value added oral care products that will drive the market^{1,2}

- The global toothpaste market is expected to reach \$12.7 billion by 2012⁴
- The increase of sales is mainly seen due to growing awareness of hygiene and product innovation that provides additional features such as whitening and odor-fighting apart from just prevention of tooth decay

1. <http://www.livemint.com/2009/05/06234303/HUL-losing-market-share-as-riv.html>,
2. <http://www.reuters.com/article/2011/05/11/idUS29974+11-May-2011+BW20110511>, 3. <http://www.packagedfacts.com/Oral-Care-Products-1190801/>
http://www.prweb.com/releases/toothpaste_regular/whitening_tartar_control/prweb1537104.htm

VALUE/ADVANTAGES

- Precisely controlled polymer multilayers can be built on nanoparticles without the requirement of the cumbersome separation step after each coating of the polymer layers
- Active compounds localised as per the requirement by fine tuning the outer layer of the complexes- retained in the complex despite extensive rinsing with water
- Enables designing systems that can anchor and retain on the surface enamel of the teeth for extended periods by adjusting the ionic strengths

APPLICATIONS

- Oral hygiene application- sustained release of antimicrobial/ flavour compounds

TECHNOLOGY STATUS

- Demonstrated at the lab scale/ proof-of-concept
- On the lookout for potential partners for spin-off and licensing
- Patent application filed: Indian #- [0696/DEL/2007](#)