



# NANOPARTICLE-POLYMER COMPLEX FOR SUSTAINED RELEASE OF ORAL CARE PRODUCTS

NCL Innovations: Solutions from CSIR India

# Technology

- A process for constructing nanoparticle-polymer complex for sustained release of agents (i.e. microbial and/or flavour compounds) for oral care
- 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)
  - ▣ Encompassing outer layer with an affinity to the tooth enamel
- Active agents can be loaded (localised in the shells of the nanoparticles) in the nanoparticles for sustained release for applications in toothpastes and oral rinses

# Applications

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

# Market Potential

- The Indian market for oral care products grew to Rs. 3241 crores at a growth rate of 14.7% in 2009<sup>1</sup>
  - There is a high market demand for novel, value added oral care products that will drive the market<sup>1,2</sup>
- The Oral care product market for US is headed to reach \$8.9 billion by 2012<sup>3</sup>
  - Triclosan, the last toothpaste innovation at Colgate achieved a sales of \$450 million in the first year of its sales<sup>4</sup>
- The global toothpaste market is expected to reach \$12.7 billion by 2012<sup>5</sup>
  - 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

<sup>1</sup><http://www.livemint.com/2009/05/06234303/HUL-losing-market-share-as-riv.html> - viewed 06/06/11

<sup>2</sup><http://www.reuters.com/article/2011/05/11/idUS29974+11-May-2011+BW20110511> - viewed 06/06/11

<sup>3</sup><http://www.packagedfacts.com/Oral-Care-Products-1190801/> viewed 01/08/11

<sup>4</sup>[http://www.kanebiotech.com/oral\\_care.htm](http://www.kanebiotech.com/oral_care.htm) viewed 01/08/11

<sup>5</sup>[http://www.prweb.com/releases/toothpaste\\_regular/whitening\\_tartar\\_control/prweb1537104.htm](http://www.prweb.com/releases/toothpaste_regular/whitening_tartar_control/prweb1537104.htm) viewed 01/08/11

# Value

- Precisely controlled polymer multilayers can be built on nanoparticles without the requirement of the cumbersome purification after each coating of the polymer layers
  - Shown as Proof of Concept
- 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

# Technology Status, IP Status

- Patent application filed
- Ready to be licensed/commercialized
- Demonstrated at laboratory level

# Links & References

- Indian [provisional application](#) details
- Hata, H. et al. (2007) Encapsulation of Anionic Dye Molecules by a Swelling Fluoromica through Intercalation of Cationic Polyelectrolytes, *Chem. Mater.*, 19, 79-87

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# Summary

Technology Summary	
Technology title	Nanoparticle-polymer complex for sustained release of oral care products
Industry /sector	Personal care/oral care products
Year of development	2008
Related patents (with links)	<a href="#">Patent application</a> filed
Technology readiness level	Demonstrated at lab level
Licensing status	Ready to be licensed
Encumbrances	None
Availability	Yes