

## Nanotechnology in cosmeceuticals: Benefits vs risks

Nanotechnology is one of the new technologies used in personal care industry. The cosmetic industry is driven by innovation and companies are coming up with new technologies to help people look young. Use of nanotechnology in cosmeceutical preparations is aimed to make fragrances last longer, sunscreens more effective and anti-ageing creams fight back the years. Further, the technology is being used to optimize manufacturing conditions for skin care formulations, a multi-component system. The technology is so immense in skin care that some companies have decided to incorporate it into the hair-care product-line as well. Facts suggest that nanotechnology was being unknowingly incorporated into cosmetic formulations for at least the past 2000 years. Nanotechnology and all of its applications are projected<sup>1</sup> to be a trillion dollar global business by 2014.

Companies are shifting their focus from cosmeceuticals to nanocosmeceuticals, with the incorporation of nanotechnology in manufacturing processes.

The technology utilizes extremely tiny (or nano) particles to penetrate the skin, far more than traditional anti-ageing treatments. Some of the nanotechnology-based innovations are nano-emulsions which are transparent and have unique tactile and texture properties, nano-capsules which are used in skin-care products, nano-pigments which are transparent and

increase efficiency of sunscreen products, and liposome formulations which contain small vesicles (range: 50–5000 nm) consisting of traditional cosmetic materials that protect light or oxygen-sensitive cosmetic ingredients. Some companies are also using nanotechnology in hair-care products; research is ongoing to find ways to use nano particles to prevent hair from turning grey and also for prevention of hair loss.

Questions have arisen about the safety of products manufactured with the help of nanotechnology. Because of the ability of these particles to be captivated into skin cells, long-term effects of the chemicals being introduced into the body are not known. Likewise, questions have been raised over how nano-based cosmetic formulations might perform once they are applied onto the skin, for example, in an anti-ageing formulation. Due to their size, could such particles pierce the inner layer of the skin? Could this then lead to the particles entering the bloodstream? If so, what might be the justification<sup>2</sup>?

The market growth is tremendous, but the area of safety cannot be overlooked. While the technology is still in its early years, research and development work that go into its safety should be worked out right now.

The United States Food and Drug Administration (USFDA) has expressed concerns about the use of nanotechnology in

cosmetic treatments. The regulatory agencies are calling for some serious research into the long-term effects of nanotechnology-based cosmetics, which has been moderately unfettered since its conception. According to the USFDA, imperative research is needed to assess safety concerns about nanoparticles used in cosmetics. So the need of the hour is to have a debate/deliberation involving scientists, regulatory agencies and companies across the globe for regulatory and safety considerations of nanotechnology-based cosmetics and adopt a scientific approach of passing on the benefits of the technology to consumers.

1. Burdock, G. and Teske, S., *Functional Foods and Nutraceuticals*, February 2007, pp. 18–20.
2. Forrest, L., *Ezine Articles* 26 February 2007, accessed on 12 June 2007, <http://ezinearticles.com/?Nano-Cosmetics:-Are-They-the-Next-Great-Thing?&id=468247>.

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## Taxonomy of marine micro-algae, an addendum

The correspondence titled 'Taxonomy, the legacy of Linnaeus transformed to phylogenomics' (Sushil Kumar, *Curr. Sci.*, 2007, **92**, 1475) is indeed a timely one. In simple terms, it describes the developments in taxonomy, highlights the advent of new molecular techniques and brings works of the degenerating population of 'taxonomists' to some light of honour. We pay our tributes to Carl Linnaeus for his vision and huge task accomplished in taxonomy. Aristotle too deserves admiration here for his attempt around 300 BC, in classifying organisms, which laid the groundwork for more percep-

tive classification systems that followed, such that of Linnaeus.

Taxonomic progress and transformation of Linnaeus' legacy into phylogenomics is rather slow in the marine environment. Let me cite micro-algae (free-floating microscopic plants of 20–200 µm size) in particular as an example, since they are discussed over decades globally for notoriety in forming toxic or harmful algal blooms (HAB). Perhaps nowhere is the value of taxonomy more readily realized than when some members of these notorious groups, viz. dinoflagellates, raphidophytes and haptophytes create

havoc by suddenly populating and discolouring ocean waters and silently killing tonnes of fish and upsetting coastal ecology. Needless to say that just one HAB event can cost millions of dollars to coastal economy, besides adversely affecting human health. Despite drawing such attention of the global oceanographic community, scrutiny of data on HAB ([ioc.unesco.org/hab](http://ioc.unesco.org/hab)) reveals that only 99 new toxic species have been discovered over a period of say 170 years (between 1827 and 2004); only a small population of taxonomists have more often been associated with new discoveries or revision