Ocean Safe Biodegradable Microspheres for the Cosmetics and Toiletries Industry

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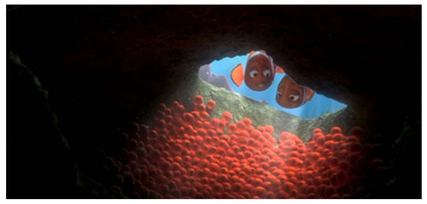
Problem

Non-degradable plastic microbeads are found in cosmetics and toiletries products worldwide and end up washing into the world's oceans where, because they can persist for decades, even centuries, and their small size mimics plankton-like prey, they are ingested by marine animals ranging from zooplankton and mussels to fish and whales.

Microbeads → Mussels → Blue Crab → Striped Bass

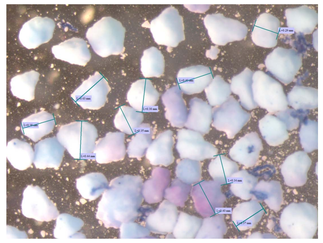


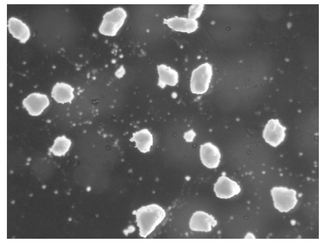
Hey, wait a second – those aren't eggs!

Proposed Solution

Naturally derived biodegradable polyhydroxyalkanoate (PHA) microbeads quickly degrade in the marine environment and are an "ocean-safe" alternative to synthetic non-degradable microbeads.

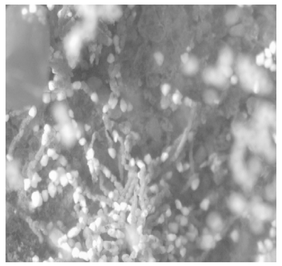
We are working to produce PHA microbeads in the size range (≈ 45µm to 400 µm) suitable for the cosmetic and toiletries industry and show that they quickly biodegrade in wastewater treatment facilities and the marine environment.



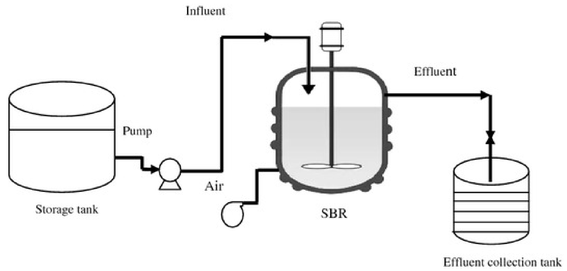


Early-stage work

PHA microbeads on bottom sediment

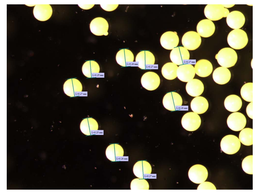


PHA microbeads sequestered in bottom sediments by worms and amphipods for rapid biodegradation

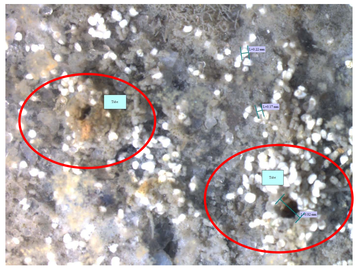


Bench-scale sequencing batch reactor for testing in wastewater treatment facility (experiment ongoing)

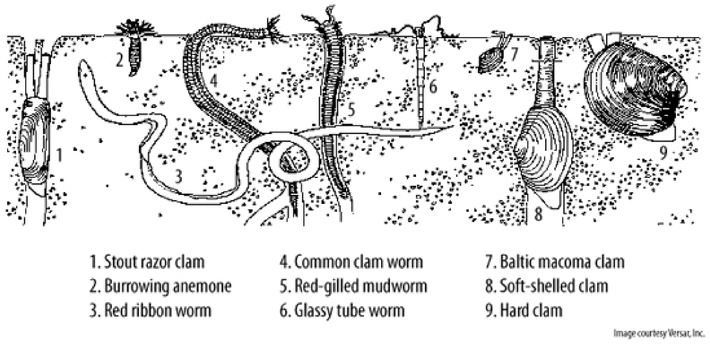
PHA microbeads



PE microbeads



Worm tubes with incorporated PHA microbeads



United States Patent Application No. 13/950,493 filed July 25, 2013: *"Method for Reducing Marine Pollution using Polyhydroxyalkanoate Microbeads"*

Markets

Cosmetic and toiletries sales exceeded $36 billion in the U.S. in 2010. The skin care product class alone accounted for 25%.

Stakeholder Feedback

Unilever, L'Oreal, and Johnson & Johnson have all recently announced they would phase out use of plastic microbeads and are investigating alternatives.

Economic Impact

The ability to manufacture low cost, biopolymer microbeads in a consistent form and size range with the capacity to add dye and proof of rapid biodegradation presents an opportunity for a first mover to offer an inexpensive "Ocean Safe" microbead for the cosmetics and toiletries industry.

"All drains lead to the Ocean" (Finding *Nemo,* Walt Disney)

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