



# Nanoparticles for Re-chargeable Eco-Friendly Self-cleaning of **Industrial and Medical Surfaces**



## The Problem

Bacterial attachment to surfaces leading to the formation of communities of bacterial cells is a major problem as bacteria's most characteristic phenotype of the biofilm mode of growth is its inherent resistance to disinfection, antimicrobial treatment and immune response killing.



## The Solution

This novel invention provides environmental-friendly polymeric nanoparticles exhibiting antimicrobial and self-cleaning activity following a simple halogenation procedure.



## The Commercial Benefit

Our innovative polymeric nanoparticles:

- are capable of oxidizing high organic loads while maintaining remarkable stability to repetitive organic/bacterial loading cycles compared to common disinfectants.
- can be easily recharged with halo atoms and thus be used repeatedly for various desired applications.
- can be incorporated in or applied to various solid substrates which are thereby imparted with efficient and long lasting antifouling, antimicrobial and self-cleaning activities surfaces (antifouling, antimicrobial, anti-fungal, anti-virus, etc.).
- can be incorporated within other formulations, thereby conferring anti-microbial characteristics, which make them especially suited for use, e.g. in hospitals, and public domains.



## Market Potential

Traditionally, one large segment of the anti-fouling market are paints or coatings applied to the hull of a boat, ship, or yacht to reduce the growth of organisms on the part of the ship that is under water and to prevent corrosion. The application of such coatings improves the durability and performance of the vessel. The need to reduce fuel consumption of ships is driving growth of the global marine coating market. The marine coatings market is projected to grow from USD 8.29 Billion in 2017 to USD 10.82 Billion by 2022, at a CAGR of 5.45% during the forecast period from 2017 to 2022.

This market represents just a single market segment among many that can be addressed by the innovative technology.

The global Anti-microbial Coatings market, another potential market, is expected to reach USD 3.8 billion by 2020. This market growth is predicted to be influenced by the increasing percentage of hospitals and advanced health care facilities across the globe as well as on the mounting need to reduce infection risks in such facilities. Moreover, the rise in trend of the health club and fitness center is also expected to drive the market up.



## Target Markets/Industries

- Marine coatings market
- Water disinfection market
- Medical & health care market
- Restaurants & lodging market
- Institutional & Commercial market
- Disinfectant and antimicrobial chemicals market
- Anti-microbial Coatings market



## Intellectual Property

Patent pending



## Team: Primary Inventor

### Prof. Shlomo Margel

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- Professor Margel received his Ph.D. from the Department of Materials Science, at the Weizmann Institute.
- He completed his postdoctoral studies at the California Institute of Technology (CALTECH), Department of Inorganic Chemistry.
- He served as a senior scientist at the Jet Propulsion Laboratory at CALTECH.
- Professor Margel worked as an associate Professor, at the Department of Materials Science, the Weizmann Institute.
- Prof. Shlomo Margel was a visiting scientist at DuPont, Central Research and Development at the Polymer Section, University of Ulm, Germany, at the Department of Physical Electronics, Tokyo Institute of Technology, Japan at the Institute for Soldiers' Nanotechnologies, MIT, Cambridge, MA.
- He acted as the Dean of the Faculty of Exact Sciences of Bar-Ilan University.
- Prof. Margel was nominated by the Israel Academy of Sciences as Chairman of the National Committee of Chemistry towards IUPAC
- Professor Margel published more than 270 publications, has been awarded 29 patents and he is the author of a few chapters in several books



## Future Research

Graft polymerization of N-haloamine brushes and nanoparticles covalently bound to solid surfaces (e.g., plastic sheets and glass) for self-cleaning and anti-biofouling applications.



## The Opportunity

Companies are invited to license our patent through a licensing agreement with or without sponsored research.



## Keywords

- Anti-fouling coating
- Anti-biofilm coatings
- N-halopolyamide
- Antifouling
- Antimicrobial
- Anti-fungal
- Anti-virus