



Innovative Therapeutic DNA Nano-Robots



The Problem

Contemporary cancer therapies involving invasive surgery and blasts of drugs can be as painful and damaging to the body as the disease itself.



The Solution

Our DNA nano-robots could potentially change the world of medicine as we know it. We are using DNA as a programmable building block for the design and fabrication of logic-guided nano-robots and machines. These machines can be programmed to carry out autonomous tasks based on biological computing. We are also using them as chassis to fabricate multi-agent systems with biometric swarm behaviors and decentralized logic. Our DNA nano-robots could potentially change the world of medicine as we know it. They can be utilized as an internal disease management system, combining specific delivery of one or more molecules with conditioned (programmed) response to environmental signals (internal and external).



The Commercial Benefit

In contrast to all other available technologies of drug delivery, our robots do not release the drug, but keep it attached to them, simply turning it ON (by opening themselves) or OFF (closing themselves back). This ensures the drug cannot attack its target when the robots are closed. Our robots, like no other robot, can be very easily loaded with proteins, nucleic acid therapeutics, polymers and particles. Several classes of small molecules can be bound as well. It is therefore a platform, allowing different therapeutic payloads to be optimized for use. We already showed that drugs that were considered too toxic can be now controlled very accurately when loaded into the robots. Thus, we expect our technology to enable other molecules, existing drugs or NCEs, to advance to market by passing the toxicity barrier.



Market Potential

Drug delivery technology market is projected to reach USD 1,669 Billion by 2021 from USD 1,179.20 Billion in 2016 (at a CAGR of 7.2%). Some of the major factors driving the growth of this market are the increasing prevalence of chronic diseases, increasing demand for biologics, technological advancements, and new product launches.



Target Markets/Industries

Pharmaceutical industry



Intellectual Property

Patent pending



Team: Primary Inventor

Dr. Ido Bachelet

- Bachelet is known for his contribution to the fields of DNA origami, Nanotechnology, and Nanorobotics.
- His well cited paper "A logic-gated nanorobot for targeted transport of molecular payloads", which deals with nanoscale robots being able to kill cancer cells, created an important interface between the field of DNA origami and medicine. Dr. Ido Bachelet's work represents a significant step toward the implementation of biological computing in living organisms.
- Dr. Bachelet earned his Ph.D. from the Hebrew University in Jerusalem. Dr. Ido Bachelet was an engineering postdoctoral fellow at M.I.T. and later a bioengineering postdoctoral fellow at Harvard University, specializing in DNA origami and synthetic biology at the George Church lab.
- Until 2015 he was an assistant professor in the Faculty of Life Sciences and the Nano-Center at Bar-Ilan University.
- Dr. Bachelet is the founder of several companies, such as the computer vision company Sight Diagnostics.



Future Research

Classified research in a private, non-university based research laboratory



The Opportunity

We invite industrial companies to license our patent through a licensing agreement with sponsored research



Keywords

- Nano-robots,
- Drug delivery,
- Nanotechnology,
- Dna robots,
- Dna origami,
- Nanomedicine,
- Dna nanobot