

Hybrid micro and nanoBots as future active drug carriers

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Most of the current drug delivery systems (DDS) rely on passive transport into the fluid where they swim, which is not ideal for delivering payloads to specific locations with high efficiency. It was envisioned decades ago that scientists would engineer tiny nano-bots that actively and directly transport payloads to specific locations. Ever since then, great advances have been made in the field of nanorobotics, however it has been only until very recently when biocompatible, metal-free motors using biocompatible fuels have been reported.

Mimicking biomotors, scientists used catalytic reaction to power artificial nano-bots. [1]. Nanomotors demonstrated the transport of drugs [2] micro-objects [3] and cells [4] with wireless magnetic guidance [5], temperature [6], and light control [7]. Furthermore, they can act collectively reacting to external stimuli like chemotactic behaviour [8] and are capable of cleaning polluted water [9].

Here, I will present our recent developments in this fascinating field. We fabricate nano-bots from mesoporous silica nanoparticles, microspheres and rolled-up thin films into microtubular jets. Very recently, we have found that hybrid Micro-bio-bots combine the best from the two worlds, biology and nanomaterials providing very promising bio-related applications.

Keywords: nanomotors, nanotechnology, drug delivery, active matter, self-propulsion, bots.

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