

Nano-bots as future trends in nano-bio-medicine

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Engineering tiny nano-bots that actively and directly transport drugs to specific locations is envisioned to be part of future nano-medicine. Over the last few years, there has been increasing interest in the use of chemistry to propel tiny machines in a similar way that nature uses biochemistry to power biological motors. Self-powered micro-nano-bots can be fabricated from multiple materials and by various methods, and have presented various applications in robotics, biosensing, nanomedicine, microfluidics, and environmental field [1].

Here, I will present our recent developments in this fascinating field. We fabricate nano-bots from mesoporous silica nanoparticles (Fig.1), microspheres up to rolled-up microtubular engines. Our types of hybrid Micro-bio-bots combine the best from the two worlds, biology and artificial nanomaterials providing remote control with biocompatible fuels.

Nanomotors demonstrated the transport of drugs [2] micro-objects [3] and cells [4] with wireless magnetic guidance [5], temperature [6], and light [7]. Furthermore, they can act collectively reacting to external stimuli like chemotactic behaviour [8] and are capable of cleaning polluted water [9].

References

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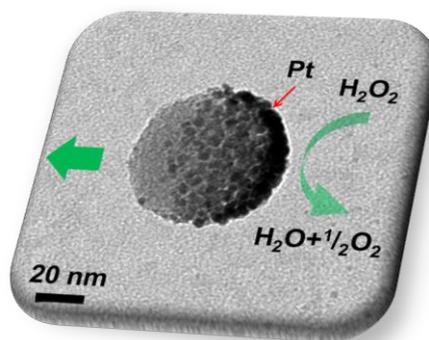


Figure 1. Mesoporous Silica Janus Nanobots containing Pt on one side of the particle catalytically decompose H_2O_2 fuel and self-propell in solutions. Adapted from reference 2.