# Nanomotors: Active nanoparticles that move, respond to stimuli, sense, clean, and transport drugs efficiently

**Samuel Sánchez**

[1]*Smart Nano-Bio-Devices Group, Institute for Bioengineering of Catalonia (IBEC), The Barcelona Institute for Science and Technology (BIST), Barcelona, Spain*
[2] *Catalan Institute for Research and Advanced Studies (ICREA), Barcelona, Spain*
ssanchez@ibecbarcelona.eu

Inspired by nature, researchers have been exploring the possibility to mimic the rich multifunctionality of molecular motors, cells and other microorganisms capable of moving, interacting, communicating and cooperate in complex biological environments. Artificial nanomotors are active particles that constantly consume energy from their surroundings to engage in self-propulsion and mimic biological micro-swimmers in many ways.
One of the challenges in nanotechnology is to engineer smart systems which can respond to stimuli and act accordingly to a given task. Among other interesting applications, the design of nanovehicles which can eventually be applied in vivo for medical purposes for imaging and/or directed drug delivery is of outmost importance. Major advances have been demonstrated towards that end, however, questions like "how to swim at the nanoscale, how to achieve motion control and how to image these nanobots" need to be properly addressed.
Here, I will present our recent developments in the field of nanomotors that can autonomously swim and perform complex tasks in vitro [1]. Our "bots" combine the best from the two worlds: biology (enzymes, single cells and tissues) and (nano)technology (nanoparticles, 3D Bioprinting) providing remote control, guidance and actuation. We demonstrated the efficient transport and the enhanced release of drugs into cancer cells [2] and spheroids [3], sensing [4] capabilities and their use in water remediation [5].

## References

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[2] X. Ma, A. C. Hortelao, T. Patiño, S. Sánchez. *ACS Nano.* **2016**, 10 (10), 9111-9122.
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[4] T. Patino et al. *NanoLett.* **2019. DOI:** 10.1021/acs.nanolett.8b04794
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## Figures


**Figure 1:** Fundamental studies and applications of self-powered nanomotors (covers from references 5 and 1 b)