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Nano and microrobots for biofilm eradication and microplastics remediation

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Abstract. Nano and microrobots are emerging as revolutionary tools in combating environmental pollution and biofilm-related health issues, focusing on removing micro and nanoplastics from water bodies and eradicating biofilms that hinder medical treatments and device functionality. These tiny engineered systems are designed to address challenges in environmental preservation and healthcare by adsorbing plastic particles to reduce aquatic pollution and directly targeting and disrupting the structure of biofilms to enhance treatment efficacy, respectively. Highlighting the innovative designs and mechanisms of nano and microrobots, this discourse delves into their recent advancements and potential in addressing stubborn problems in environmental and biomedical fields, offering insights into their future development and the challenges that lie ahead in fully harnessing their potential for sustainable solutions.



References

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2. C.C. Mayorga-Martinez, L. Zhang, M. Pumera, *Chem. Soc. Rev.*, 2024, *53*, 2284-2299
3. M. Urso, M. Ussia, F. Novotný, Martin Pumera, *Nature Communications* 2022, *13*, 3573



Short bio. Prof. Martin Pumera is the Head of the Advanced Nanorobots and Multiscale Robotics Laboratory at Technical University Ostrava and the Chief Investigator of the Future Energy & Innovation Lab at CEITEC, Brno, Czech Republic. He founded the Center for Advanced Functional Nanorobots at University of Chemistry and Technology Prague, where he served as director from 2017 to 2023. Previously, he was a tenured group leader at the National Institute for Materials Science in Japan in 2006, and associate professor at the Nanyang Technological University in Singapore in 2010 for a decade. Prof. Pumera has diverse research interests in nanomaterials and microsystems, particularly in the areas of micro and nanomachines, electrochemistry, and 3D printing. As of October 2024, he has co-authored +1000 scientific publications with +70000 citations and h-index of 128 (GoS).

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