MAGNETICALLY POWERED MICROROBOTS USED FOR ENVIRONMENTAL REMEDIATION

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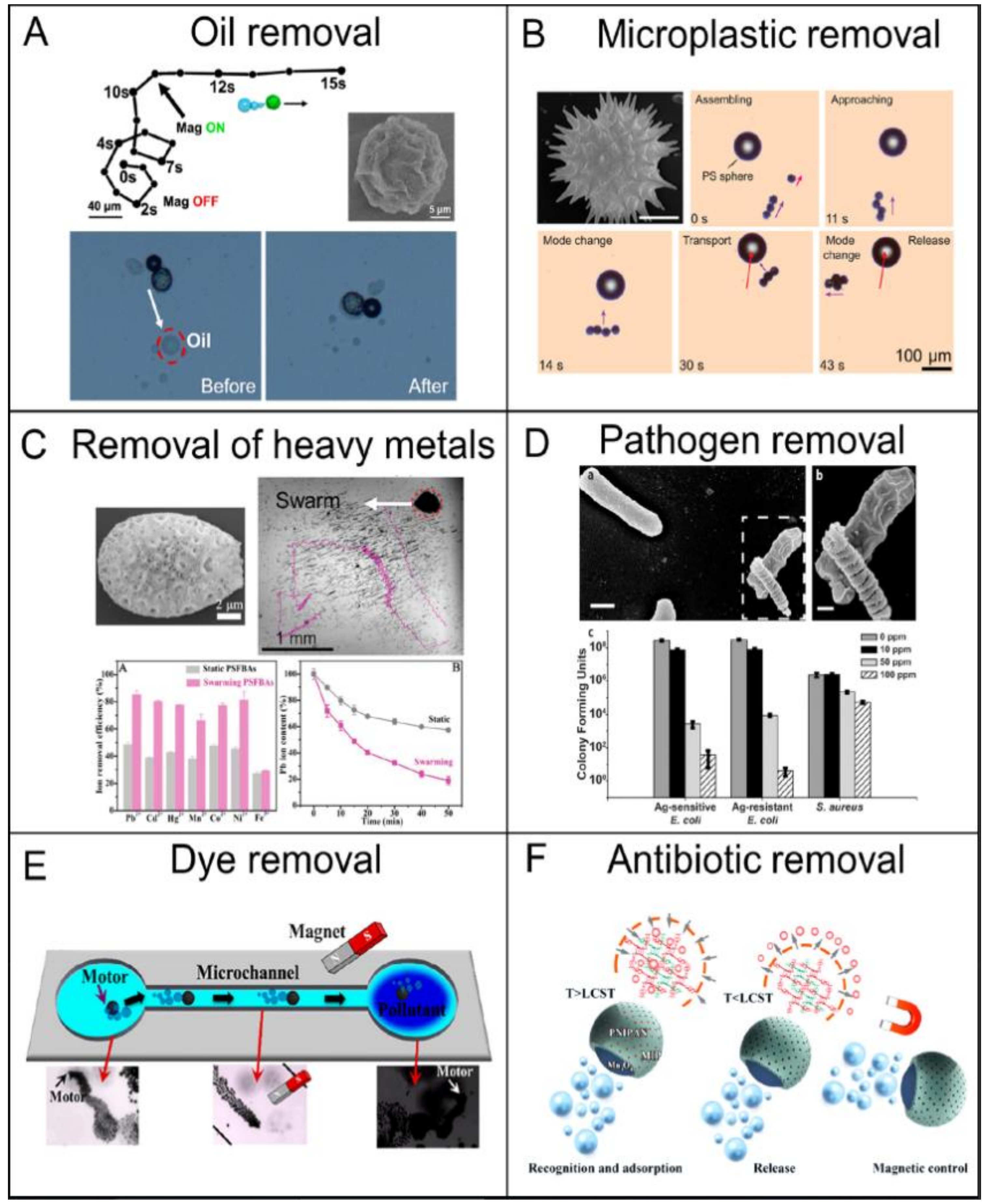
| Introduction

Microrobots are artificial machines with the ability to move and dimensions in the nano or micrometer range. Their essence is to execute given instructions using their own propulsion or an external power source. The basic job of such robots is mainly to deliver substances or materials to a destination specified by the user.. In terms of sustainability, the principle that robots do not damage the environment into which they are sent is also important, which can be achieved, for example, by recycling, where the robot is used, cleaned and then returned to the environment, or by bio-degradation, where reuse of the robot is no longer possible but the environment is not adversely affected.



| Magnetically propulsed microrobots

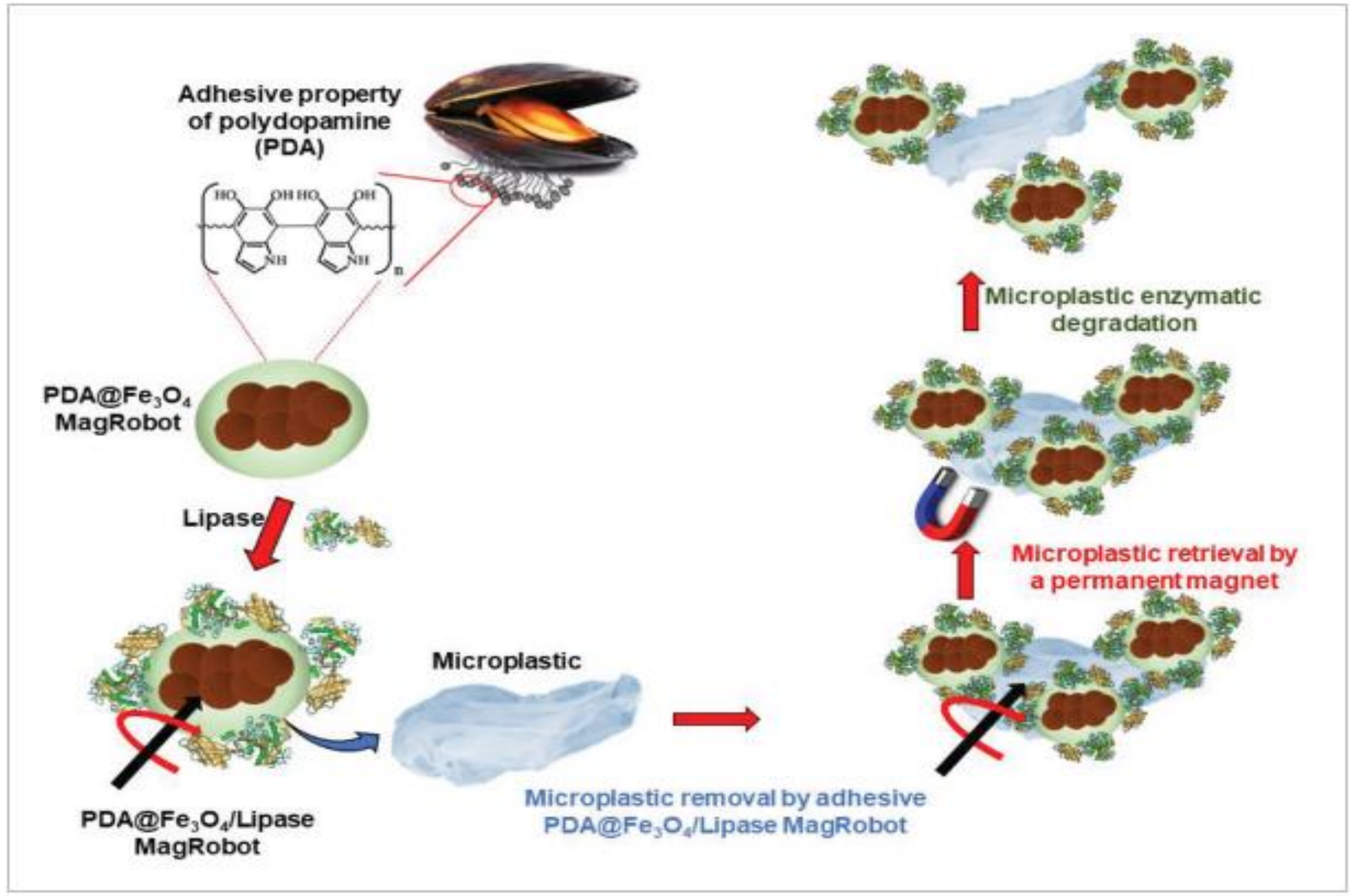
The use of magnetically driven robots has indisputable advantages over other types - they allow excellent remote manipulation, because the magnetic field serves as a non-invasive way to manipulate robots without contact, although this method is also limited by the strength of the magnetic field and the distance that needs to be manipulated between the source and receiver of the magnetic forces. At the same time, no toxic fuels are required for movement, so it is a clean process and the risk of toxic effects of fuels on the biological environment in which the robots operate is eliminated. Other advantages include reconfigurability, programmability, recyclability, or versatility.

| Results

Of the actuators that appear to be suitable for powering microrobots (chemical, light, ultrasound, electric, magnetic), the magnetic actuator was chosen as the most suitable. For such a drive to function, it is necessary to provide a ferromagnet that maintains its magnetization, thus becoming a manipulation system for robot movement. This in turn can be corkscrew-like (similar to sperm), wave-like (similar to fish), and surface-assisted actuators that use frictional forces to move.

| Conclusion

It has been verified that magnetically propulsed microrobots are being used for environmental remediation. The theory describing sorption followed by enzymatic degradation will be verified in our experiments using rGO (reduced graphene oxide), hGO (holey GO), GO and PDA (polydopamine) while using Fe_2O_3 as a magnetic component, whereby various pollutants will be tested.



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