Photocatalytic nanostructures and nanocomposites: sustainable solutions for tackling environmental challenges

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In the last decades, increasing concerns have been arisen on environmental issues related to decontamination of environment from different pollutants, including organic compounds and microbial species. The development of effective and sustainable materials, methods and technologies is critical for tackling the needs of environmental protection.
In particular, the recent advances in the control of nanoscale materials and in the investigation of photocatalytic processes for degradation of organic pollutants and inactivation of bacteria and viruses in water envision a new scenario for nanoscience-inspired design, synthesis, and formulation of industrially relevant catalytic materials for water remediation. [1-2]
Original synthetic approaches have been developed to achieve diverse catalytically active nanoparticles, with peculiar size dependent optoelectronic and catalytic properties, with controlled size, shape, also coupled or doped with relevant compounds, and in multifunctional nanocomposites, providing flexible and versatile tools to access an innovative class of multifunctional materials with superior photocatalytic properties in the UV and visible range. In addition, realization and control of composite particle architecture over multiple length scales are fundamental for catalyst scale-up and large-scale manufacturing as well as for their exploitation in specific chemical processes, including design and realization of advanced reactors based on properly fabricated reusable and recoverable catalysts.[3]

References

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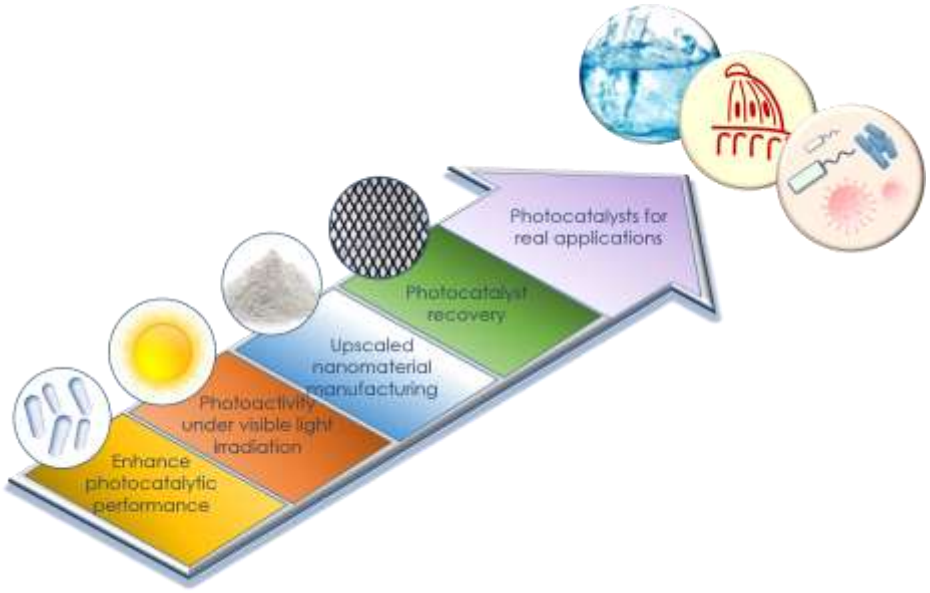

Figure 1: Sketch of strategies for photocatalytic nanomaterials development to improve performance and enable integration in real applications