

MATERIALS SCIENCE AND TECHNOLOGY

DM 630/NPC Srl - Preparation of innovative (nano)materials for photocatalytic wastewater treatment

Funded By	NPC Srl [P.IVA 01518560097] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [Piva/CF:97429780584]
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Context of the research activity	<p>This PhD position concerns the development of innovative materials for the photocatalytic treatment of wastewater to significantly reduce the environmental impact of industrial sectors already operating in the regional and national context. Heterogeneous photocatalysis does not use harmful substances and offers an environmentally and economically sustainable alternative to currently used treatment processes.</p> <p>The activity concerns the synthesis of tailored oxide semiconductors, and their physico-chemical characterization, with the final objective of integrating powders into macroscopic supports to facilitate their separation from water purified by a photocatalytic treatment.</p> <p>Progetto finanziato dal PNRR a valere sul DM 630/2024 - CUP E14D24002460004</p> <p>The activation of the position with scholarship is subject to the possible allocation of further funding by the MUR.</p>
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	<p>The project will be developed in tight collaboration with NPC srl, a leading company in the construction of plants for influent water treatment (ultrapure) and chemical treatment of industrial waters (steam generators, evaporation towers, water purification plants). NPC works with both the power generation industry and the waste-to-energy section always associated with the production of EE, particularly in the food, manufacturing, and petrochemical industries</p> <p>The research activity focuses on the removal of persistent pollutants that are recalcitrant to the most common wastewater treatment techniques using innovative technology based on highly efficient photocatalytic systems. In particular, the activity of the PhD student will be based on designing new synthetic strategies for the preparation of highly efficient photocatalytic formulations as well as physicochemical characterization in terms of structural, optical, and morphological features. Characterisation results will be</p>
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Objectives	<p>correlated with those of catalytic activity to understand the structure/composition-activity relationship.</p> <p>The innovative aspect of the research will be the use of supramolecular chemistry for the synthesis of highly efficient catalysts in the degradation of pollutants in the presence of visible or solar light. Another innovative aspect will be the structuring of photoactive phases in macroscopic media to facilitate their separation from purified water. Photocatalytic tests will be conducted on wastewater from plants managed by the industrial partner. The reduction or total elimination of contaminants from the water will facilitate their reuse within the company's production cycle.</p> <p>The technology covered by this research project aims to go beyond traditional methods of treating wastewater from specific production processes and will allow NPC to enter new industrial sectors, such as textiles, chemicals and agri-foods, as the photocatalytic process is effective in removing compounds refractory to traditional treatments. The project has a high potential for technology transfer and research activities will involve advanced knowledge in materials engineering and chemistry, provided by the research organizations and transferred to the industrial partner's staff for use in their production area.</p>
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Skills and competencies for the development of the activity	<p>Candidates are required to have defended a MSc Thesis in: Chemical Engineering, Material Engineering; Industrial Chemistry; Chemistry; Materials Science; Industrial Biotechnologies.</p> <p>Previous activities of the candidates in the field of catalysts design and/or materials chemistry methodologies constitute a preferential skill for the selection process.</p> <p>Capacity to work in a multidisciplinary team and to prioritize the own work for accomplishing deadlines.</p>
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