**Photocatalytic Materials for a Greener Tomorrow**

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The growing demand for a cleaner and more sustainable environment has driven the development and adoption of green technologies across many aspects of daily life. In particular, the need for purified air [1] and water [2]—further emphasized by the recent pandemic —has brought photocatalytic (P/C) materials to the forefront [3]. This presentation will elaborate on the general applications of photocatalytic materials and their advantages in mitigating environmental issues. Moreover, the study will be focused on the synthetic route as well as the characterization of novel core-shell structures in terms of morphological, structural and photocatalytic activation. The formation of the core-shell begins with TiO2 as the core material following the decoration, shell formation, with carbon dots (CDs) and/or silver (Ag) nanoparticles through chemical modification. The well-defined core-shell structures were confirmed via transmission electron microscopy (TEM) images and the crystalline structure was defined from X-ray diffraction (XRD) analysis. All prepared nanomaterials have been evaluated regarding their photocatalytic activity in both liquid and gaseous pollutants. Specifically, the study for the degradation of methylene blue (MB) dye was investigated under direct solar irradiation, whereas the degradation of nitrogen oxides (NOx) was tested under ultraviolet and visible light irradiation, in accordance with standard ISO procedures.

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[1] Yuanchen Wei, et al.,TiO2-Based Photocatalytic Building Material for Air Purification in Sustainable and Low-Carbon Cities: A Review **(**2023**),** Catalysts, 13, 1466.

[2] Moreno-Vargas, et al., Photocatalysis as an Alternative for the Remediation of Wastewater: A Scientometric Review.” (2024) ChemEngineering, 8, 95.

[3] Abhinandan Kumar, et al., Green aspects of photocatalysts during corona pandemic: a promising role for the deactivation of COVID-19 virus. (2022) RSC Advances, 12, 13609