

## Utilizing contact lens-TiO<sub>2</sub> Nanocomposites for sustainable wastewater remediation

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Growing concerns about plastic waste and microplastic pollution from products like contact lenses determine the need for innovative environmental solutions. This study, performed in the framework of the PNRR project SAMOTHRACE, originally introduces a sustainable method for creating photocatalytic nanocomposites for wastewater treatment. TiO<sub>2</sub> nanoparticles were integrated into waste contact lenses via controlled spray deposition. The nanocomposites were thoroughly characterized using a range of techniques: TGA to evaluate the thermal stability and the TiO<sub>2</sub> content, SEM/TEM for the morphological analyses, Raman spectroscopy to assess the structural properties, and Z-potential analysis to determine the surface charge. The photocatalytic performance of the nanocomposites was tested by measuring the photodegradation under UV light of two common pollutants: methylene blue dye and sodium dodecyl sulfate surfactant. Additionally, the antibacterial properties were performed using Escherichia coli as a model organism. This work offers a new, economic, and easy way to prepare photocatalytic nanocomposites from waste contact lenses for a sustainable wastewater treatment.