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| Abstract Title | Photoelectrocatalytic based advanced oxidation process for the simultaneous removal of organic micro-pollutants from wastewater treatment plant effluent. |
| Topic | ■ Improving water quality<br>O Resilient water systems<br>O Circular solutions: Reuse, Recover and Recycle<br>O Transitions in water, agro/food and energy |
| Challenges and Solutions | Challenges: Conventional WWTP are not capable to fully remove OMPs from the influent.<br>Solutions: Photoelectrocatalytic based advanced oxidation process will be a cost effective and eco-friendly solution. |
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| Abstract | The presence of organic micro-pollutants (OMPs) in the surface water resources is becoming a major problem in maintaining and enhancing water quality. Wastewater treatment plants (WWTP) effluents are becoming one of the major sources of releasing OMPs in the surface water. Photoelectrocatalytic based advanced oxidation process (AOP) is one of the promising technologies to remove OMPs from WWTP effluents. In this study, we used ultrasonic spray pyrolysis (USP) to fabricated bismuth vanadate based heterojunction electrodes that can be activated by the incoming solar light to produce reactive species that can remove molecules of OMPs through an oxidative mechanism. The fabricated electrodes were characterized through different material and optical characterization techniques to analyze different properties of the electrodes. Fabricated electrodes were utilized for the simultaneous removal of 11 OMPs (mainly pharmaceuticals) in real WWTP effluent. The starting concentration of each OMP was at 10 µg $L^{-1}$ in the effluent and 1 V |

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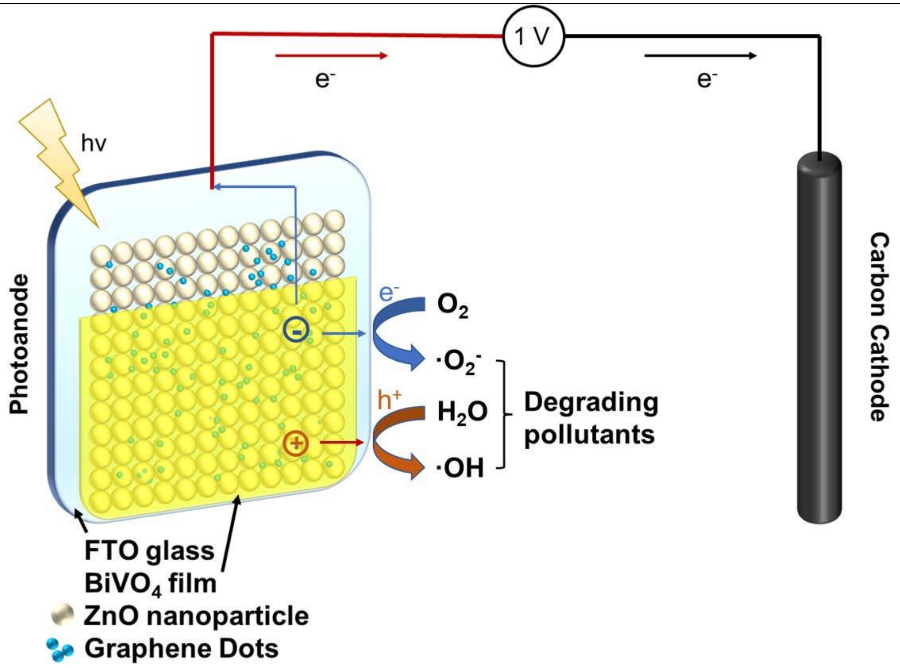
| | was applied as an external voltage to enhance the reaction kinetics. Six out of 11 OMPs showed more than 50% removal at the end of 3 hr reaction time. Based on the results of removal study, it was believed that the chemical structure of the OMP including the presence of functional groups influenced the removal kinetics of the OMPs. The results of this study are encouraging and techniques used in this research including the electrode fabrication holds the potential to be upscaled to develop a large scale solar driven wastewater treatment facility that focuses on the removal of OMPs at low concentrations. Combination of homogenous and heterogeneous catalysis approach can be applied to achieve faster removal kinetics and resultantly decreasing the reaction time to less than 30 min. |
| Figures/diagrams/illustrations |   |