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Innovative photocatalytic nanofiltration technology for micropollutants abatement and water reuse of Agro-industrial effluents-LIFE PureAgroH2O

The LIFE PureAgroH2O project has a strongly demonstration character, targeting the development of a close-to-market PNFR reactor that utilises an in-house developed and patented water purification device, accommodating advanced photocatalytic monoliths and porous polymeric fiber- stabilized VLA-photocatalysts, which has been verified to effectively eliminate organic substances from wastewater. The innovation of the reactor lies on the synergy between two of the most efficient processes for the removal of pesticides from Agro-wastewater, namely nanofiltration and photocatalysis. This synergy concludes to significant process intensification that in turn leads to the reduction of the reactor dimensions (CAPEX) and the concomitant cut in the operational cost (OPEX). The consortium strives also to ensure the autonomous operation of the process and safeguard stable efficiency that will not depend on the seasonal conditions (solar irradiation) and the agro-wastewater composition. In addition, the feasibility of achieving 60 % reduction in the required transmembrane pressure, significant extension of the life time of the process (2-fold) and higher effectiveness in the elimination of organic and inorganic pollutants (+99.5%) by developing the next generation aligned SWCNTs based photocatalytic monoliths, will be verified with the purpose of integrating them with the PNFR process.

Consequently, the LIFE PureAgroH2O project proposal is unique and demonstrates evidence of innovation due to the implementation of state-of-the-art technologies in water treatment (photocatalytic nanofiltration), advanced materials (novel VLA-TiO_2 augmented aligned SWCNT membranes), lighting (remote irradiation with optic fibers and new light emitting diode products) and powering (photovoltaics, energy storage technologies) and integration of the aforementioned sub- technologies into a final commercially available PNFR reactor. The full-scale prototype system is capable of automatic control and recording and can be exploited in many commercial applications.