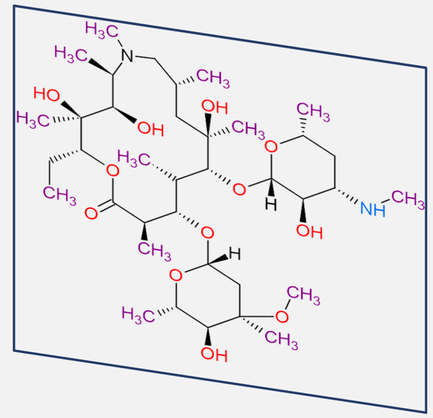
Azithromycin removal from wastewater by photocatalytic degradation

Giovanina-Iuliana Lupu[1], Cristina Orbeci[1], Liliana Bobirică[1], Constantin Bobirică[1]
[1] Department of Analytical Chemistry and Environmental Engineering, Faculty of Chemical Engineering and Biotechnologies
National University of Science and Technology Politehnica Bucharest, Romania,
*cristina.orbeci@upb.ro

Objectives

- ❖ developing a novel Nb-TiO_2/fiberglass – rubberized silicone photocatalytic membrane
- ❖ removal of azithromycin from wastewater

Azithromycin



Methodology

❖ ***UV photocatalytic reactor:***

- ➢ volume 1.5 L
- ➢ UV lamp 120 W
- ➢ Nb-TiO_2/fiberglass – rubberized silicone photocatalytic membrane

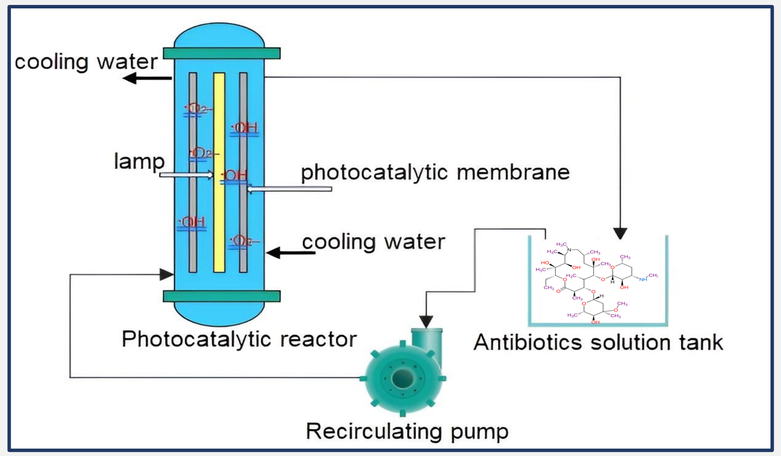
❖ ***Operating conditions:***

- ➢ recirculation flow rate 2.0 L/min
- ➢ pH of AZT working solution of 3
- ➢ H_2O_2/AZT molar ratio of 1.
- ➢ AZT initial concentration of 250 mg O_2/L

Preparation of photocatalytic membrane:

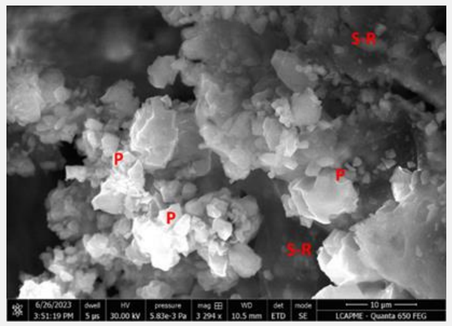
• photocatalyst was prepared by combustion synthesis method

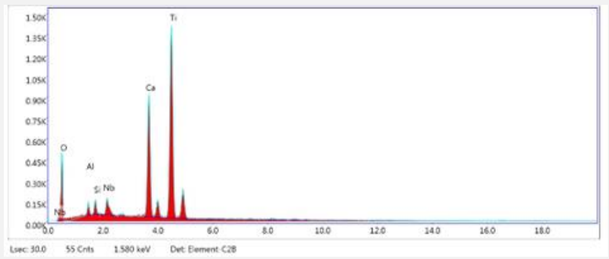
• fiberglass net was immersed in the thin layers of the rubberized silicone - photocatalyst mixtures (molar ratio 5/1)



Results and discussion

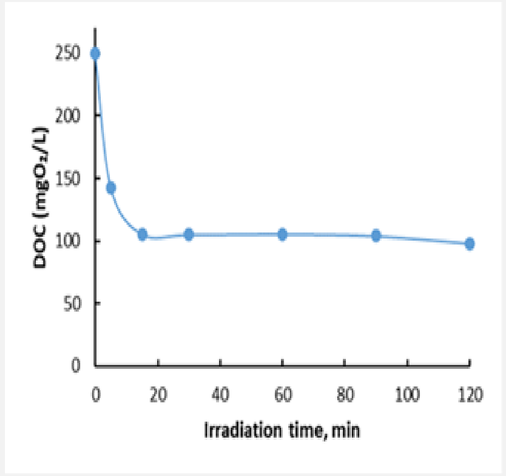
SEM-EDX of the photocatalytic membrane



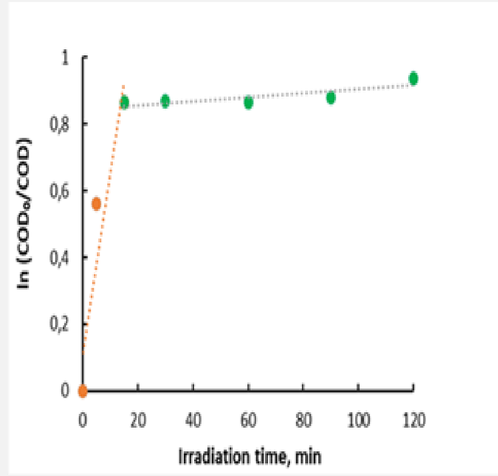


P – photocatalyst
S-R – silicon rubber

Photocatalytic degradation of azithromycin: a. evolution of the organic substrate concentration as a function of the irradiation time; b. pseudo-first-order kinetics



a.



b.

Conclusions

- 🕮 Good photocatalytic activity of the Nb-TiO_2/fiberglass-rubberized silicone membrane;
- 🕮 Degradation of the organic substrate follows pseudo-first order kinetics in two stages;
- 🕮 First stage – the organic substrate is degraded around 60%;
- 🕮 Second stage – slow degradation of the organic intermediates.

Funding: This work has been funded by the European Social Fund from the Sectoral Operational Programme Human Capital 2014-2020, through the Financial Agreement with the title "Training of PhD students and postdoctoral researchers in order to acquire applied research skills - SMART", Contract no. 13530/16.06.2022 - SMIS code: 153734.