

**3D POROUS DIMENSIONALLY STABLE ANODE-INTEGRATED PARTICULATE ELECTRODE-ELECTROCHEMICAL FILTERING SYSTEM FOR ADVANCED TREATMENT OF CYTOSTATICS-CONTAINING WATER (3DSAPECYT) - PN-III-P2-2.1-PED-2019-4492; Contract no. 441/2020**

**Stages 1 and 2 (2020-2021; 14 months)**

Synthesis and characterization of new porous dimensionally stable anodes. Optimization of particulate electrode composition. Design and fabrication of an innovative three-dimensional (3D) porous dimensionally stable anode-integrated particulate electrode-electrochemical filtering system;

**Results obtained:**

Lots of porous DSA type electrode materials; Morpho-structural and electrochemical characteristics of the electrode materials; Various compositions of the particulate electrode; Innovative three-dimensional (3D) porous dimensionally stable anode-integrated particulate electrode-electrochemical filtering system;

**Dissemination activity:**

*Published ISI-ranked papers:*

1. Mircea Nicolaescu, Cornelia Bandas, Corina Orha, Viorel Serban, Carmen Lazău and Simona Căprărescu, Fabrication of a UV photodetector based on n-TiO<sub>2</sub>/p-CuMnO<sub>2</sub> heterostructures, Coatings 2021, 11, 1380. <https://doi.org/10.3390/coatings11111380>, IF=2,881
2. Raluca Dumitru (m.Vodă) , Sorina Negrea, Cornelia Păcurariu, Adrian Surdu, Adelina Ianculescu, Aniela Pop and Florica Manea, CuBi<sub>2</sub>O<sub>4</sub> synthesis, characterization, and application in sensitive amperometric/voltammetric detection of amoxicillin in aqueous solutions, Nanomaterials 2021, 11, 740. <https://doi.org/10.3390/nano11030740>, IF=5,076
3. Sorina Negrea, Lidia Ani Diaconu, Valeria Nicorescu, Sorina Motoc (m. Ilies), Corina Orha and Florica Manea, Graphene oxide electroreduced onto boron-doped diamond and electrodeposited with silver (Ag/GO/BDD) electrode for tetracycline detection in aqueous solution, Nanomaterials 2021, 11, 1566. <https://doi.org/10.3390/nano11061566>, IF=5,076

*Participations and presentations at scientific conferences:*

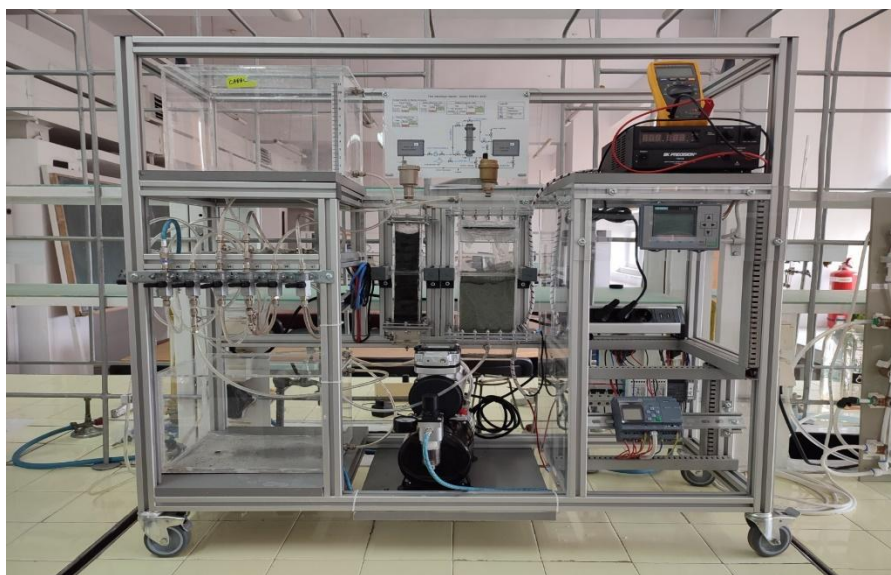
1. Corina Orha, Mina Ionela Popescu, Cornelia Bandas, Mircea Nicolaescu, Carmen Lazau, Florica Manea, Porous SnO<sub>2</sub>/Ti dimensionally stable anode for degradation of pollutants from water: synthesis and morphostructural characterization, Proceedings of the 26th International Symposium on Analytical and Environmental Problems, ISBN 978-963-306- 771-0, 2020, 216-220 - poster presentation;
2. Corina Orha, Cornelia Bandas, Carmen Lazau, Mina Ionela Popescu, Mircea Nicolaescu, Sorina Negrea, Aniela Pop, Florica Manea, Tin oxide onto titanium substrate for advanced degradation of cytostatics from water, 11th International Conference on Environmental Engineering and Management, 8-10 september 2021 Muttentz, Switzerland - oral presentation;
3. Sergiu Vasilie, Claudia Delcioiu, Aniela Pop, Corina Orha, Florica Manea, Comparative study regarding adsorptive abilities of activated carbon, natural zeolite and manganese sand of cytostatics from water, 11th International Conference on Environmental Engineering and Management, 8-10 september 2021 Muttentz, Switzerland - oral presentation;
4. Corina Orha, Cornelia Bandas, Mircea Nicolaescu, Mina Ionela Popescu, Carmen Lazau, Florica Manea, Synthesis of porous Ti/SnO<sub>2</sub> electrode by sol-gel spin-coating method for degradation of pollutants from water , TIM20-21 Physics Conference 11-13 November 2021, Timisoara, Romania - poster presentation;
5. Corina Orha, Mina Ionela Popescu, Cornelia Bandas, Mircea Nicolaescu, Carmen Lazau, Florica Manea, Comparative morphostructural and electrochemical characterization of porous Ti/SnO<sub>2</sub> correlated with the synthesis method, 27nd International Symposium on Analytical and Environmental Problems, 22-23 November 2021 , Szeged, Hungary - poster presentation;
6. Mircea Nicolaescu, Carmen Lazau, Corina Orha, Cornelia Bandas, The influence of different corrosion solutions on the TiO<sub>2</sub> morphology obtained by thermal oxidation of Ti foils, 27nd International Symposium on Analytical and Environmental Problems, 22-23 November 2021, Szeged, Hungary - poster presentation;

### Stage 3 (2021-2022; 11 months)

Testing 3D-PDSA-PE-EFS system in removal, degradation and mineralization of cytostatic from water

#### Results obtained:

Functional and operational characteristics of innovative three-dimensional (3D) porous dimensionally stable anode-integrated particulate electrode-electrochemical filtering system



*Image of automated 3D-PDSA-PE-EFS system obtained in this project*

#### Dissemination activity:

##### *Published ISI-ranked papers:*

1. Carmen Lazau, Mircea Nicolaescu, Corina Orha, Viorel Serban, Cornelia Bandas, Self-powered photodetector based on FTO/n-TiO<sub>2</sub>/p-CuMnO<sub>2</sub> transparent thin films, Materials 2022, 15, 5229. <https://doi.org/10.3390/>, IF=3.75
2. Corina Orha, Cornelia Bandas, Carmen Lazau, Mina Ionela Popescu, Anamaria Baci, Florica Manea, Advanced electrodegradation of doxorubicin in water using a 3-D Ti/SnO<sub>2</sub>anode, Water 2022, 14 (5), 821.<https://doi.org/10.3390/w14050821>, IF=3.53
3. Sergiu Vasile, Liviu-Danut Vitan, Constantin-Adrian Tudoran, Florica Manea, Flexible electroflotocoagulation reactor: new design and testing in treatment of real surface water, Water 2022, 14(19), 2990.<https://doi.org/10.3390/w14192990>, IF=3.53
4. Carmen Lazau, Cornelia Bandas, Mircea Nicolaescu, Corina Orha, Aniela Pop, A Facile dip-coating process graphene-TiO<sub>2</sub> on titanium foil for hybrid electrode fabrication, 2022 International

Semiconductor Conference (CAS), 2022, pp. 277-280, doi: 10.1109/CAS56377.2022.9934754 (ISI proceedings).

5. Corina Orha, Mircea Nicolaescu, Cornelia Bandas, Carmen Lazau, Anamaria Baci, Florica Manea, Comparative morpho-structural and electrochemical characterization of the La and F doped porous Ti/SnO<sub>2</sub> dimensionally stable anodes, 2022 International Semiconductor Conference (CAS), 2022, pp. 285-288, doi: 10.1109/CAS56377.2022.9934122 (ISI proceedings).

*Romanian patent request:*

1. Florica Manea, Constantin-Adrian Tudoran, Liviu-Danut Vitan, Corina Orha, Anamaria Baci, Cornelia Banda, Lacrima-Crysty Ighian, INSTALAȚIE SI PROCEDEU DE FILTRARE ELECTROCHIMICĂ 3D PENTRU TRATAREA AVANSATĂ A APEI, cerere de brevet nr. 28880/ 14.11.2022.

*Book chapters:*

1. Aniela Pop, Sorina Motoc, Florica Manea, Carbon nanomaterials-based sensors for water treatment in Carbon Nanomaterials-Based Sensors Emerging Research Trends in Devices and Applications (Eds. J. G. Manjunatha, C.M. Hussain), Elsevier, 2022, ISBN: 978-0-323-91174-0, <https://doi.org/10.1016/B978-0-323-91174-0.00025-1>

2. Anamaria Baci, Sorina Negrea, Florica Manea, Electrocatalytic degradation of organic pollutants from water in: Photocatalysts and Electrocatalysts in Water Remediation: From Fundamentals to Full Scale Applications (Eds. P. Bhunia, K. Dutta, S. Vadivel), John Wiley & Sons 2023 (in publishing)

*Participations and presentations at scientific conferences:*

1. Carmen Lazau, Cornelia Bandas, Mircea Nicolaescu, Corina Orha, Aniela Pop, A facile dip-coating process graphene-TiO<sub>2</sub> on titanium foil for hybrid electrode fabrication, 2022 International Semiconductor Conference (CAS), 12-14 octombrie 2022, Poiana Brasov (ISI proceedings), poster presentation

2. Corina Orha, Mircea Nicolaescu, Cornelia Bandas, Carmen Lazau, Anamaria Baci, Florica Manea, Comparative morpho-structural and electrochemical characterization of the La and F doped porous Ti/SnO<sub>2</sub> dimensionally stable anodes, 2022 International Semiconductor Conference (CAS), 12-14 octombrie 2022, Poiana Brasov (ISI proceedings), (ISI proceedings), poster presentation

3. Anamaria Baci, Mina Ionela Popescu, Corina Orha, Bandas Cornelia, Carmen Lazau, Florica Manea, Porous Sn-Sb<sub>2</sub>O<sub>4</sub> onto titanium substrate for advanced degradation of cytostatics from water, BRAMAT 2022 12<sup>th</sup> International Conference on Materials Science & Engineering Transilvania University of Brasov – Romania Materials Science and Engineering Faculty, on-line, 9 -12 martie 2022, oral presentation

4. Aniela Pop, Mina Ionela Popescu, Corina Orha, Anamaria Baci, Florica Manea, Assessment of activated carbon sorption for capecitabine from water, International Black Sea Coastline Countries Scientific Research Symposium – VI, 29-30 august 2022, on-line, Bulgaria, oral presentation

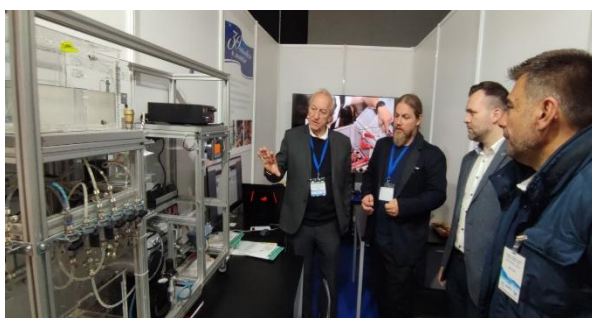
5. Anamaria Baci, Corina Orha, Sergiu Vasilie, Mircea Nicolaescu, Florica Manea, Comparative assessment of porous undoped and doped (Sb, La, F) tin oxides for degradation and mineralization of

doxorubicin from water, International Black Sea Coastline Countries Scientific Research Symposium – VI, 29-30 august 2022, on-line, Bulgaria, oral presentation

6. Sorina Motoc (Ilies), AnamariaBaciu, Florica Manea, Electrochemical platform based on nanostructured carbon electrode for determination of anti-inflammatory drugs (NSAID) in water, International Symposium on Solubility Phenomena and Related Equilibrium processes, on-line, 4-9 Septembrie, oral presentation

#### *Exhibition:*

1.Constantin-Adrian Tudoran, stand EXPO-APA- Forumul Regional al Apei “Dunăre-Europa de Est” 28-30 septembrie 2022, Sibiu, Romania



#### **Awards**

*for 3D Porous dimensionally stable anode-integrated particulate electrode-electrochemical filtering system for advanced treatment of cytostatic-containing water (3DSAPECYT) (research project):*

1.Florica Manea, Corina Orha, Constantin-Adrian Tudoran; 13th International Conference on Innovative Research EUROINVENT – ICIR 2021, 20-21 May 2021, Iasi, Romania (**Silver medal**)

2. Florica Manea, Corina Orha, Constantin-Adrian Tudoran; International exhibition of Inventions and innovations “Traian Vuia”, 14 October 2021, Timisoara, Romania (**Gold medal**)

3. Florica Manea, Corina Orha, Constantin-Adrian Tudoran; 25<sup>th</sup> International Exhibition of Inventios, INVENTICA 2021, 23-25 June 2021, Iasi, Romania (**Silver Medal**)

4. Florica Manea, Corina Orha, Constantin-Adrian Tudoran; II<sup>nd</sup> edition International Exhibition INVENTCOR , 16-18 December 2021, Deva, Romania (**Gold medal**)

5. Florica Manea, Corina Orha, Constantin-Adrian Tudoran; International Exhibition of Scientific Research, Inventions and innovations, 19<sup>th</sup> Edition, 20-22. October 2021, Cluj-Napoca, Romania (**Excellence diploma**)

6. Florica Manea, Corina Orha, Constantin-Adrian Tudoran; International Specialized Exhibition INFOINVENT XVII<sup>th</sup> Edition, 17-20 November 2021, Chisinau, Republica Moldova (**Gold medal**)

7. Florica Manea, Corina Orha, Constantin-Adrian Tudoran; International Specialized Exhibition INFOINVENT XVII<sup>th</sup> Edition, 17-20 November 2021, Chisinau, Republica Moldova (***Diploma – Trophy “Best Innovation and technology transfer project”*** )