

Raportarea activității Centrului de cercetare **Sisteme de Energii Regenerabile si reciclare** in Laboratorul L7

Perioada raportării: ianuarie–decembrie 2023

**1. Proiecte de cercetare - dezvoltare**

*Date de identificare a proiectului*

*Activități/ Evenimente desfășurate în Institut*

Titlul proiect	Peri- oada	Coordonator, Responsabil UTBv/ Membru echipa
<i>Demonstrator si tehnologie in flux continuu cu fotocatalizator VIS/solar-activ pe substraturi sferice pentru epurarea avansata a apelor uzate (PhotoCatBed), 598 PED /2022</i>	2022- 2024	S.l. dr. ing. Maria Covei
<i>Multicultural Classrooms: Inclusive Learning and Teaching in Higher Education (MultiClass), Proiect Erasmus+, 2022-1-TR01-KA220-HED-000085687KA220-HED</i>	2022- 2024	Prof. dr. ing. Anca Duta
<i>Innovative teaching and learning paths for the prevention of new drugs abuse (INES), Proiect Erasmus+, KA220 2021-1-IT02-KA220-SCH-000032570</i>	2021- 2024	Prof. dr. Dana Perniu
<i>EDU4PlastiCircular - Education for Plastic in a Circular and Climate Neutral Economy, Preventing Waste Ending Up into the Environment, ERASMUS+ KA220-HED 2023-1-R001-KA220-HED-000166242 (CO: Universitatea Politehnica Timisoara, Romania)</i>	2023- 2025	Prof. dr. Dana Perniu
<i>Innovative Tools for Enhancing E-Learning Solutions in Universities, Digttools, ERASMUS+ 2020-1-IE02-KA226-HE-000781</i>	2020- 2023	/Prof. dr. Dana Perniu
<i>Environmental education - OERs for Rural Citizens (EnvEdu), 19-COP-0038, Program: Granturi SEE-Mecanismul Financiar 2014-2021; Programul de educație, burse, ucenicie și antreprenoriatul tinerilor;</i>	2020- 2023	Prof. dr. Camelia Draghici
<i>Noi materiale compozite hibride multifunctionale pe baza de deșeuri destinate creșterii eficienței termice și sustenabilitatii cladirilor, 702PED /2022</i>	2022- 2024	Conf. dr. Cristina Cazan
<i>Compozite ecologice realizate prin tehnici de imprimare 3D pentru obtinerea panourilor fonoabsorbante, PN-III-P1-1.1- TE-2021-0294</i>	2022- 2024	CS.II Mihai Alin Pop / Mihaela Cosnita

<i>Microreactoare hibride pentru eliminarea compusilor farmaceutici activi din apele uzate, PN-III-P4-PCE2021-1020</i>	2021-2024	/Conf. dr. Cristina Cazan
<i>Optimizarea funcțională a 4 Sisteme solar termice integrate în rețeaua publică de termoficare Brașov (PT1 Astra, PT2 Hărman Zizin, PT6 Tractorului, CT Pasaj Bartolomeu, Contract cu terti</i>	2023	Conf. dr. ing. Moldovan Macedon

Aceste granturi au avuta activitati care s-au derulat, integral, in Institut.

Rezultatele activitatilor s-au concretizat in publicarea unei carti, 3 capitole in carti (2...4), 13 articole in jurnale ISI (5...17), 4 articole publicate in volume BDI (18...21) si in participarea la evenimente stiintifice:

- **Publicatii in volume si jurnale**

- 1) Draghici, C., Sluser, B.M., Simion, C.P. (Eds), EDUCAȚIE PENTRU MEDIU ÎN COMUNITĂȚI RURALE SUSTENABILE. GHID DE UTILIZARE A RESURSELOR EDUCATIONALE DESCHISE”, Editura Universitatii Transilvania din Brasov, Brasov, 2023, ISBN 978-606-19-1524-8
- 2) Perniu D., Drăghici C., Mediul și educația pentru mediu, in Drăghici C., Slușer B.M., Simion C.P. (Eds), Educație pentru mediu in comunități rurale sustenabile. GHID DE UTILIZARE A RESURSELOR EDUCATIONALE DESCHISE, Editura Universită ii Transilvania din Brașov, 2023, p. 21-40
- 3) Covei M., Visa I., Duta A., Self-cleaning photocatalytic ceramic coatings, ADVANCED CERAMIC COATINGS: FUNDAMENTALS, MANUFACTURING AND CLASSIFICATION, Chapter 6, Elsevier series in advanced ceramic materials, 2023, p. 137 - 156
- 4) Tismanar I., Bogatu C., Gheorghita S., Duta A., Visible-and solar-active photocatalytic ceramic coatings, ADVANCED CERAMIC COATINGS: FUNDAMENTALS, MANUFACTURING AND CLASSIFICATION, Chapter 11, Elsevier, 2023, p. 233-254
- 5) Cazan, C., Enesca, A., Isac, L., Andronic, L., Cosnita, M., Accelerated Aging of Polymeric Composites Based on Waste with TiO<sub>2</sub> Fillers, *ACS Applied Polymer Materials*, 5 (2023) 3958-3970 (FI = 5.0)
- 6) Cosnita M., Cazan C., Pop M.A., Cristea D., Aging resistance under short time ultraviolet (UV) radiations of polymer wood composites entirely based on wastes, *Environmental Technology & Innovation*, Volume 31, 2023, 103208, ISSN 2352-1864, (FI = 7.10)
- 7) Pop, M.A.; Cosnita, M.; Croitoru, C.; Zaharia, S.M.; Matei, S.; Spîrchez, C. 3D-Printed PLA Molds for Natural Composites: Mechanical Properties of Green Wax-Based Composites. *Polymers* 2023, 15, 2487, (FI=5.00)

- 8) Gurău, L.; Timar, M.C.; Coșereanu, C.; Cosnita, M.; Stanciu, M.D. Aging of Wood for Musical Instruments: Analysis of Changes in Color, Surface Morphology, Chemical, and Physical-Acoustical Properties during UV and Thermal Exposure. *Polymers* 2023, 15, 1794. (FI = 5)
- 9) Covei M., Bogatu C., Gheorghita S., Duta A., Stroescu H., Nicolescu M., Calderon-Moreno J.M., Atkinson I., Bratan V., Gartner M., *Influence of the deposition parameters on the properties of TiO<sub>2</sub> thin films on spherical substrates*, *Materials* 16 (2023), 2453765 (FI = 3.7)
- 10) Cretescu, N., Neagoe, M., Saulescu. R. Dynamic Analysis of a Delta Parallel Robot with Flexible Links and Joint Clearances. *Applied Sciences* (2023), 13(11):6693 (FI = 2.7)
- 11) Saulescu, R., Jaliu, Neagoe, M., Ciobanu, D., Cretescu, N. Comparative analysis of torque-adding wind energy conversion systems with a counter-rotating vs. conventional electric generator, (2023) *Frontiers in Energy Research* 11, pp. 1-14 (FI = 3.8)
- 12) Bogatu C., Covei M., Polo-López M. I., Duta A., Malato S., Novel ZnO photocatalysts for pollutants' abatement under solar radiation at pilot plant scale, *CATALYSIS TODAY* 413, Article Number 113947, 2023 (FI = 6.5)
- 13) Macedon Moldovan, Bogdan-Gabriel Burduhos, Ion Visa, Efficiency Assessment of Five Types of Photovoltaic Modules Installed on a Fixed and on a Dual-Axis Solar-Tracked Platform, *Energies* 2023, 16(3), 1229 (FI = 3.25)
- 14) Gurău, L.; Timar, M.C.; Coșereanu, C.; **Cosnita, M.**; Stanciu, M.D. Aging of Wood for Musical Instruments: Analysis of Changes in Color, Surface Morphology, Chemical, and Physical-Acoustical Properties during UV and Thermal Exposure. *Polymers* 2023, 15, 1794. (FI = 5.0)
- 15) Cretescu, N., Neagoe, M., Saulescu. R. Dynamic Analysis of a Delta Parallel Robot with Flexible Links and Joint Clearances. *Applied Sciences*. 2023 (FI = 2,8)
- 16) Gheorghita S., Bogatu C., Duta A., TiO<sub>2</sub> – g-C<sub>3</sub>N<sub>4</sub> thin film photocatalyst on large substrates for advanced wastewater treatment, *JOURNAL OF SOL-GEL SCIENCE AND TECHNOLOGY*, acceptat spre publicare in 29.10.2023 (FI = 2.6)
- 17) Tismanar I., Duta A., Vis-active TiO<sub>2</sub>–gC<sub>3</sub>N<sub>4</sub> photocatalytic coatings for advanced wastewater treatment and self-cleaning applications, *Journal of Engineering Sciences and Innovation*, 8(1), pp. 63-68, 2023 (FI=-)

- 18) Salca Rotaru C., Draghici C., Schwegmann S., (2023) Open Educational Resources for Learning Waste Management in Rural Communities, Bulletin of the *Transilvania University of Braşov*, Series VII: Social Sciences ■ Law (under review).
- 19) Repanovici A., Perniu D., Popa D., Module 5: Smart Tools for Digital Content Creation in: Repanovici A., Koukourakis M., Ferrándiz S., (Eds) *Innovative Tools for Enhancing E-Learning Solutions in Universities, Blended Curriculum*, ISBN 978-84-09-56886-4, 2023
- 20) Gheorghita S., Bogatu C., Duta A., *Self-cleaning surfaces based on  $TiO_2-g-C_3N_4$  composite*, CAS 2023 International Semiconductor Conference Proceedings, 29-32, 2023
- 21) Repanovici A., Perniu D., Popa D., Module 5: Smart Tools for Digital Content Creation in: Repanovici A., Koukourakis M., Ferrándiz S., (Eds) *Innovative Tools for Enhancing E-Learning Solutions in Universities, Blended Curriculum*, ISBN 978-84-09-56886-4, 2023

- **Participare la conferinte**

- 1) Covei M., Bogatu C., Perniu D., Gheorghita S., Duta A., Stroescu H., Nicolescu M., Calderon-Moreno J.M., Atkinson I., Bratan V., Gartner M., *Composite  $TiO_2-gC_3N_4$  thin film beads for advanced wastewater treatment*, 18th International Conference on Chemistry and the Environment (ICCE 2023), Venetia, 11-15 iunie 2023, POSTER
- 2) Burduhos B.G., Neagoe M, *Analysis of software estimated vs. produced electrical energy by five types of photovoltaic modules installed in the continental climate*, Conference on Sustainable Energy 2023, *prezentare orală*
- 3) Covei M., Bogatu C., Gheorghita S., Duta A., Stroescu H., Nicolescu M., Calderon-Moreno J.M., Atkinson I., Bratan V., Gartner M., *Comparative assessment of  $TiO_2-GO$  and  $TiO_2-gC_3N_4$  photocatalytic thin films on spherical substrate*, 12th International Conference on Environmental Engineering and Management (ICCEM 2023), 13-16 Septembrie 2023, Iasi, Romania, *prezentare orală*
- 4) Bogatu C., Perniu D., Iorga O., Isac L., Tismanar I., Duta A., *Photocatalytic dispersions based on  $TiO_2-Cu_xS$  for self-decontamination fabrics*, 12th International Conference on Environmental Engineering and Management (ICCEM 2023), 13-16 Septembrie 2023, Iasi, Romania, *prezentare orală*
- 5) Gheorghita S., Bogatu C., Duta A., *Stability of the photocatalytic thin film  $TiO_2 - g-C_3N_4 - poster$* , 12th International Conference on Environmental Engineering and Management, (ICCEM 2023), 13-16 Septembrie 2023, Iasi, Romania
- 6) Covei M., Bogatu C., Gheorghita S., Tismanar I., Duta A., Stroescu H., Nicolescu M., Calderon Moreno J. M, Atkinson I., Bratan V. Gartner M., *Composite photocatalytic*

- beads based on TiO<sub>2</sub> and carbon derivatives for wastewater treatment*, RomPhysChem, 25-26 sept 2023, Bucuresti, Romania, prezentare orală
- 7) Stroescu H., Gartner M., Calderon Moreno J.M., Atkinson I., Bratan V., Covei M., Gheorghita S., Bogatu C., Perniu D., Duta A., *Substrate influence on the properties of TiO<sub>2</sub> photocatalytic surfaces*, Conference for Sustainable Energy (CSE), 26-28 oct 2023, Brasov, Romania - prezentare orală
  - 8) Gartner M., Stroescu H., Calderon Moreno J.M., Atkinson I., Bratan V., Covei M., Gheorghita S., Bogatu C., Perniu D., Duta A., *VIS-solar active composites based on TiO<sub>2</sub> and carbon derivatives (GO and gC<sub>3</sub>N<sub>4</sub>)*, Conference for Sustainable Energy (CSE), 26-28 oct 2023, Brasov, Romania, prezentare orală
  - 9) Bogatu C., Gheorghita S., Covei M., Duta A., *Photocatalytic thin films based on TiO<sub>2</sub>-g-C<sub>3</sub>N<sub>4</sub> composites for advanced wastewater treatment*, Conference for Sustainable Energy (CSE), 26-28 oct 2023, Brasov, Romania, prezentare orală
  - 10) I. Tismanar, A. Duta, *In situ prepared photocatalytic composite of TiO<sub>2</sub> – g-C<sub>3</sub>N<sub>4</sub>*, 7<sup>th</sup> Conference for Sustainable Energy, CSE 2023, 26-28 October 2023, Brasov, Romania, prezentare orală
  - 11) Covei M., Tismanar I., Diamantino T.C., *The stability of TiO<sub>2</sub>-rGO self-cleaning photocatalytic coatings for outdoor applications*, 18<sup>th</sup> International Conference on Chemistry and Environment, ICCE2023, 11-15 June 2023, Venice, Italy, prezentare orală
  - 12) Cazan, C., *Research and development priorities for C&D waste recycling to support a circular economy*, 4th Edition of World Congress on Geology & Earth Science, Roma, Italia, prezentare orală
  - 13) Cazan, C., Cosnita, M., Georgescu, S., *Properties of Sound Absorption Composite Materials Developed Using C&D Waste*, 2nd International Conference On Civil, Structural and Environmental Engineering, Barcelona, Spania, POSTER
  - 14) Cosnita, M., Cazan, C., *Current routes in recycling the Silicon Photovoltaic module (Si-PV) wastes*, World Conference on World Recycling Convention, Madrid, Spania, prezentare orală
  - 15) Perniu D., Salcă Rotaru C., Cocuz M.E, Draghici C., *Ethical Dilemmas in Approaching the New Psychoactive Substances Subject in Educational Projects, Ethical Values in Nowadays Society*. The Ethics of Sustainable Development – from Education to Diplomacy, VESA, 4-6 May 2023, Braşov, Romania
  - 16) Draghici C., Salca Rotaru C., Perniu D., Simion C.P, Finger D.C, *Open Educational Resources for Environmental Education and Environmental Citizenship, The Culture of Sustainable Green Urban Development – Technical, Social and Environmental Challenges*, 25 May 2023, Timisoara, Romania

- 17) Salca Rotaru C., Draghici C., *New Perspectives of Environmental Monitoring Definition*, 12th International Conference on Environmental Engineering and Management, 13 – 16 September, 2023, Iasi, Romania
- 18) Perniu D., Draghici D., Teodosiu C., Sustainable water services from the ISO 37120 perspective. Brasov, Romania case study, 12th International Conference on Environmental Engineering and Management, 13 – 16 September, 2023, Iasi, Romania
- 19) Isac, L., Enesca, A., The influence of carbon nanotube and GO on the photocatalytic activity of WO<sub>3</sub>/Bi<sub>2</sub>S<sub>3</sub>/Cu<sub>2</sub>S toward pharmaceutical active compounds from wastewater, International Conference on Chemistry and the Environment (ICCE 2023), 11 - 15 June 2023, Venice, Italy
- 20) Neagoe, M., Saulescu, R., Jaliu, Cretescu, N. Dynamic Modeling and Simulation of a Counter-Rotating Wind System with 1-DOF Planetary Speed Increaser. Proceedings of the 16th World Congress of the International Federation for the Promotion of Mechanism and Machine Science IFToMM, 05-09.11.2023, Tokyo, Japan, in M. Okada (Ed.): IFToMM WC 2023, MMS 149, Vol. 3, pp. 742–752, 2024, ISBN 978-3-031-45708-1, ISBN 978-3-031-45709-8 (eBook)
- 21) Neagoe M., Increasing the electrical energy output using tracked PV systems, 100% Renewables for Energy-Intensive Industries, Transilvania University of Brasov, 14 March 2023, Brasov
- 22) Verder Scientific - International Symposium; 10 – 13 mai 2023 la Universitatea Politehnica Bucuresti;
- 23) *Gala Cercetarii Romanesti, 31 ianuarie 2023*, Bucuresti, Ateneul Roman

## 2. Conferințe/ Workshop-uri/ Alte tipuri de evenimente organizate

In perioada de raportare s-au organizat urmatoarele evenimente:

- 1) Denumire: *RE4Industry Knowledge Transfer Seminar Romania, 100% Renewables for Energy-Intensive Industries*

Data: 14 martie 2023

Numar participanti: 50

Participare: internationala, din invatamant si industrie

- 2) Denumire: *Conference for Sustainable Energy, editia a 7-a*

Data: 26-28.10.2023

Numar de participanti: ~75

Participare: internationala, din invatamant, cercetare si industrie

### 3. Conferințe/ Workshop-uri/ Alte tipuri de evenimente la care s-a participat și la care lucrările prezentate încă nu s-au propus pentru publicare

Membrii ai Centrului de Cercetare au participat cu lucrări la:

- Collegiate Wind Competition CWC2023, Boulder, USA, 09-22.05.2023
- Seminarul Național de Mecanisme și Olimpiada Națională de Mecanisme, 25-26 mai 2023, Băile Felix.
- Seminarul Eficiență energetică pentru tranziția energetică în România, Brașov, 11-12.05.2023, participare națională
- I4 SDG Workshop Bilbao, Spania, 22-23.06.2023
- SPEA

În care s-au prezentat lucrările de mai jos (încă) nepropuse pentru publicare:

1) Rusea D, Moldovan M, Visa I Novel Pseudo 3D Design of Solar Thermal Facades with Triangle and Trapeze Solar Thermal Collectors for Increased Architectural Acceptance, *Conference for Sustainable Energy, CSE, 26-28.10.2023, Brasov*

2) Neagoe M., Jaliu C., Saulescu R., Dynamic analysis of two wind turbines with 2-DOF speed increaser and counter-rotating vs. conventional electric generator, *Conference for Sustainable Energy, CSE, 26-28.10.2023, Brasov*

3) Neagoe M., Jaliu C., Saulescu R., Dynamic modeling and simulation of a counter-rotating wind system with 1-DOF planetary speed increaser, *Congress IFTOMM, WC2023, November 5 – 10, Nishi-Shinjuku, Tokyo, Japan 2023*

4) Stroescu H., Gartner M., Calderon Moreno J.M., Atkinson I., Bratan V., Covei M., Gheorghita S., Bogatu C., Perniu D., Duta A., Substrate influence on the properties of TiO<sub>2</sub> photocatalytic surfaces, *Conference for Sustainable Energy, 26-28 oct 2023, Brasov, Romania;*

5) Gartner M., Stroescu H., Calderon Moreno J.M., Atkinson I., Bratan V., Covei M., Gheorghita S., C. Bogatu, Perniu D., Duta A., VIS-solar active composites based on TiO<sub>2</sub> and carbon derivatives (GO and gC<sub>3</sub>N<sub>4</sub>), *Conference for Sustainable Energy, 26-28 oct 2023, Brasov, Romania;*

6) Bogatu C., Gheorghita S., Covei M., Duta A., Photocatalytic thin films based on TiO<sub>2</sub> - g-C<sub>3</sub>N<sub>4</sub> composites for advanced wastewater treatment, *Conference for Sustainable Energy, 26-28 oct 2023, Brasov, Romania;*

7) Tismanar I., Duta A., *In situ* prepared photocatalytic composite of TiO<sub>2</sub> - g-C<sub>3</sub>N<sub>4</sub>, *Conference for Sustainable Energy, 26-28 oct 2023, Brasov, Romania;*

#### **4. Brevete si propuneri de brevete**

1) Visa I., Neagoie M., Moldovan M., Duta A., Comsit M., Burduhos B.G., Mecanism articulat bimobil de tip paralel pentru orientarea convertoarelor solare la orice latitudine, RO133554 B1

2) Cosnita Mihaela, Cazan Cristina, Visa Maria. Materiale compozite hibride din deseuri de module fotovoltaice cu siliciu, cauciuc si polietilena, RO134892 A0

3) Neagoie M., Săulescu R.G, Jaliu C.I., Munteanu O., Sistem eolian contrarotativ cu amplificator de tura ie diferen țial și generator electric contrarotativ, RO133355B1

#### **5. Doctoranzi aflati sub indrumarea membrilor centrului RESREC:**

drd. ing. Gheorghita Silvioara, Ingineria Materialelor

drd. Ing. Patrolea Alexandru, Inginerie Mecanica

#### **6. Activități cu caracter didactic**

In cadrul centrului de cercetare s-au desfasurat activitati didactice (curs, proiect, laborator) aferente programelor de studii de licenta: Ingineria Sistemelor de Energii Regenerabile (ISER), Ingineria si Protectia Mediului (IPMI) si programul de master Design de Produs pentru Dezvoltare Durabila si Protectia Mediului (DPDM) traseul T2 (Sisteme de energii regenerabile):

1. Cursuri + laboratoare IOM-SER, Instalarea Operarea si Mentenanța Sistemelor de Energii Regenerabile, master DPDM, traseul T2, anul 2
2. Cursuri SERPEE, Sisteme de energii regenerabile pentru producerea de energie electrică II, master DPDM, traseul T2, anul 2
3. Aplicatii practice aferente cursului de Materiale avansate pentru design de produs, cu studentii anului I, master DPDM:
4. Activitati didactice in cadrul disciplinei „Tehnologia hidrogenului” (ISER, anul IV), „Materiale avansate pentru designul de produs” (Master DPDM, an I)
5. Curs si aplicatii practice la disciplina Sisteme de Orientare a Convertoarelor Solare, (Master DPDM, traseul T2, an II)
6. Curs si aplicatii la disciplina Sisteme de Energii Regenerabile pentru Producerea de Energie Electrică II (Master DPDM, traseul T2)
7. Practică Sisteme electrice, licență ISER, anul 3



8. Practica pentru elaborarea proiectelor de diploma si a lucrarilor de disertatie in domeniile:

- i. materiale fotocatalitice de tip strat-uri subtiri de  $TiO_2$  sau strat-uri subtiri compozite cu matrice de  $TiO_2$  si umplutura de oxid de grafena sau nitru de carbon grafitata, cu aplicatii in epurarea avansata a apelor uzate sau pentru suprafete cu autocuratare.
- ii. reciclarea deseurilor (menajere, animaliere) pentru obtinerea de noi materiale/produse

Exemple de astfel de proiecte sunt incluse in Tabeulul de mai jos:

Titlu proiect/lucrare	Student	Coordonatori
Epurarea în vederea reutilizării a apelor poluate cu albastru de metilen utilizând strat-uri subtiri de $TiO_2$	Paroanu Loredana, IPMI	Conf. dr. Cristina Bogatu Prof. dr. ing. Anca Duta
Suprafete cu autocuratare pe baza de $TiO_2$	Olteanu Teea, IPMI	Conf. dr. Cristina Bogatu Prof. dr. ing. Anca Duta
Strat-uri subtiri cu proprietati de autocuratare fotocatalitica pentru suprafete opace	Butum Andreea, Master DPDM T3	Conf. dr. Cristina Bogatu Prof. dr. ing. Anca Duta
Strat-uri subtiri fotocatalitice stabile pe baza de $TiO_2$ și GO, depuse pe substraturi sferice pentru epurarea avansată a apei uzate	Boghiu Alina, Master DPDM T3	Conf. dr. Cristina Bogatu S. I. ing. Maria Covei
Compostarea deseurilor menajere biodegradabile	Papadopoulou Marianthi, IPMI	Conf. dr. Ileana Manciulea
Reciclarea deseurilor animaliere cu obtinere de gelatina și utilizarea acesteia pentru obtinere de biopolimeri	Grădinaru Ștefania, IPMI	Conf. dr. Ileana Manciulea

Coordonator Centru de Cercetare Prof. dr. ing. Anca Duta