ERA Chair Program- learning from others

Ciprian Iliescu
ERA Chair, eBio-hub
University “Politehnica” of Bucharest

Funded by the European Union

ERA Chair Program- learning from others

thediferetccre	Romania	Singapore
Creativity	+	-
Infrastructure	+	+
Finance	0.5% GDP	>3% GDP
HR- no of researchers/ population	8-9K/ 19mil	~40 K/7 mil
HR-time spent in the lab	50%	80-90%
HR-training	-	scholarship for students at top 10 Univ. from US+ Oxford & Cambridge
HR- foreign researchers	To be improved through PNRR i9	In 2003 – RI 50% foreign /50% local
Networking	To be improved through PNRR i9	Setup research programs with MIT, Berkeley, Duke, Yale, Imperial College
Organization	NC	All the RI grouped together with private R&D labs in close proximity also close to NUS-main university and NUH
Management	NC	Clear direction for RI- support for industry- and Universities- academic research
Output	Industry supported through research programs	Research driven industry

Bio-hub

1. A Clear Motivation

The recent technological impact on therapeutic or diagnostics led **to merging two dynamic fields - engineering and medicine -** providing tools for the health care sector such as point of care testing, nano-biomaterials, image processing or artificial intelligence. Despite the field's enormous potential, it is necessary to strengthen the research expertise for its clinical and industrial transfer. New technological platforms and the necessary "system integration" approach to developing innovative solutions for point of care applications, biosensing, or drug discovery are required.

Bio-hub

2. Clear and well-defined objectives

The ERA Chair **in biomedical engineering** (**eBio-hub**) has the following main objectives:

1. To establish within UPB a ***highly competitive interdisciplinary research centre, eBio-hub*** in biomedical engineering***, led by the ERA Chair*** and scientifically assisted by a prestigious interdisciplinary international ***Scientific Advisory Board*** (SAB) for a positive impact on research in UPB and Romania, and to develop a strategy **sustain eBio-hub after the 5-year grant period,**
2. To ***create a competitive interdisciplinary team***
3. To establish **eBio-hub-**as a centre ***with an extensive knowledge transfer in postgraduate studies at UPB-*** that supports, through the ERA Chair, habilitated members of the team and UPB Doctoral School, the setup of a PhD program in bioengineering in UPB
4. To position **eBio-hub** as a strategic research nucleus with multiple **scientific excellence** (biophysics, biomaterials, microfluidics, biosensing, chemistry, materials, microbiology and medicine) to significantly increase the amount of secured competitive national and EU fundings (research grants, industrial or public) and to enhance the collaboration with industrial and public stakeholders (to transfer the research results in the industry).
5. To **set a best practice example** that will induce structural changes in UPB or on a larger scale (i.e., a platform for future start-ups, promoting gender equality, strengthening the mobility of researchers and the flow of knowledge, promoting interdisciplinary PhD program)**.**
6. To **better use the existing state-of-the-art infrastructure** from UPB and integrate it with the research from IMT Bucharest and with the clinical lab facilities from the National Institute of Endocrinology-NIE- “C.I. Parhon”.

eBio-hub

Strengths

- Track record in technology development- Potential to develop applied solutions conveying several technological areas
- Promising research in a few specific areas, a relevant number of peer-reviewed publications
- Highly skilled in chemical engineering and material science, biomaterials
- Infrastructure: UPB has an advanced research & development centre for multi- and inter-disciplinary technologies built with the EU financial support
- Existing PhD programs: Chemical Engineering & Biomaterials
- Close collaborations with other national stakeholders, e.g., Institutes, Centres of Excellence and Competence Centres
- Good collaboration with research groups having complementary expertise Established funding instruments for research collaborations with neighbouring and EU countries
- Informal connections with non-governmental entities in the field of sustainable development and education.
- State of the art laboratory for material characterisation
- The Undergraduate program in Medical Engineering

Bio-hub

Weaknesses

- Lack of formal cooperation between researchers with a different background
- No PhD programs in Bioengineering
- Relatively weak leadership skills / insufficient human resources for ambitious research goals
- The small number of researchers in the biomedical research field
- Focus on domestic researchers, lack of foreign researchers
- Lack of knowledge among UPB members on the potential of the biomedical engineering field
- Low success rate obtaining funding for international research project proposals
- The limited research specialisation (limited by teaching requirement)
- Limited number of industrial collaborations.
- Pour transfer of new technologies to industry
- **Gender balance in engineering fields**
- Rigid decision-making process
- Lack of top 10 % cited publications, **lack of publications in Nature and Science** Weak focus on patent applications
- Weak formation of spin-offs
- Lack of cooperation with EU policymakers
- Research investment was fragmented, lacking critical mass and coordination.

Opportunities

- Emerging technology with widespread use, interesting for research funding.
- Potential for more cooperation within European Research Area (ERA).
- Potential to establish leading regional research and educational centre in biomedical engineering.
- Potential for more cooperation with other research groups within UPB.
- Potential for academic-industry or academic-clinical collaboration.
- Increase of biomedical applications locally, allowing out-of-lab testing.
- A globally growing field, interest for knowledge transfer from UPB to other institutes and private companies, especially abroad.
- Workshops and summer schools to bring to academic & non-academic entities.
- Emerging high-tech startup.
- Total alignment with the Romanian National Research and Innovation Strategy.
- Possibility to obtain more internationally competitive research funding.

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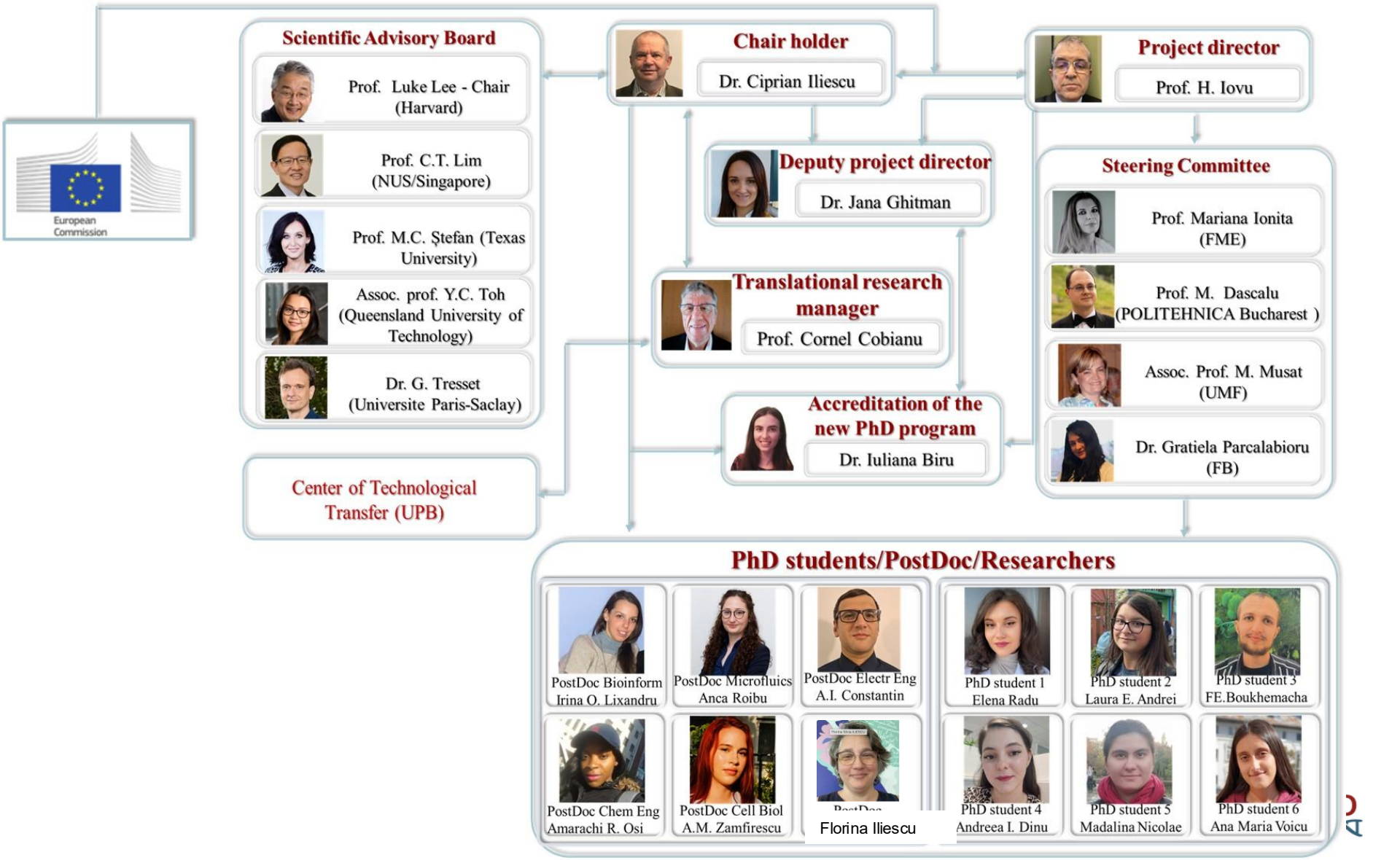
Threats

- **Rigid institutional rules and regulations**
- More focus on education, resulting in less time for research
- Lack of compliance with ERA priorities (i.e., open recruitment policy)
- Brain drains, especially of top local researchers, PhD students and post-docs
- Difficulties following global trends in chemical and medical engineering and basic research in life sciences.
- Developing a too-broad range of problem domains that could benefit from biomedical engineering.
- Research not synchronised with industrial and clinical needs
- The research focused on narrow fields, not cooperating with other research areas – weak synergies between them.
- Low student interest for postgraduate studies.
- Minimal financial support for PhD students and Post-Doc researchers

eBio-hub management structure



Florina Iliescu

KPI

The expected impact and key performance indicators of **eBio-hub** team in the field of biomedical engineering

		Impact		
		Short (1 year)	***Medium (3 years)***	***Long (end of the project)***
Scientific	**Creating high-quality new knowledge**			
	Regional research hub for biomedical	1	1	1
	Nature and Science publications	0	0	1
	SCI indexed publications (Q1)	2	14	30
	Invited lectures given by **eBio-hub** team	1	5	10
	Patents application	0	2	5
	Strengthening human capital in R&I			
	Academic staff			
	International researchers	2	2	2
	Post docs including international researchers	6	6	6
	PhD students	0	4	6
	Fostering diffusion of knowledge and Open Science			
	Open access research publications	2	12	24
	Non-funded international collaborations	1	3	6

eBio-hub

KPI

Economical / technological	**Generating innovation-based growth**			
	International project proposals funded	0	2	4
	National project proposals funded	1*	6	10
	Creating more and better jobs			
	Research position created	6	8**	10**
	Number of trained researchers transferred in industry	0	1	2
	Number of researchers involved in spin-off	0	0	2
	Leveraging investments in R&I			
	Joint ventures with business partners	0	1	2
	Private funding	0	1	2
	Open days and investor relations	0	3	5
Societal	**Addressing EU policy priorities & global challenges through R&I**			
	PhD program in bioengineering	0	1	1
	Post-graduate courses in the field of biomedical engineering	0	1	2
	Delivering benefits & impact via R&I mission			
	Spin-offs, start-ups	0	0	1
	International workshops and summer schools	0	3	6
	Strengthening the uptake of R&I in society			
	Public/Video lectures	0	3	6
	Public policy conferences	0	1	2
	International conferences/symposiums	1	3	5

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ERA Chair Program- learning from others

1. Structural changes
   - Organization of PhD program in Bioengineering

2. Organization of a research group
   - Scientific plan
   - Research evaluation by Scientific Advisory Board
   - Network
   - Data management
   - Gender aspects

Deliverables:

- Publications (30) – 1 in Nature/Science, 1 publication/year with IF>10
- IP's
- Spin-of
- Training of 4-5 group leaders in a interdisciplinary environment
- New jobs created: 10-12
- PhD program in Bioengineering (6 PhD students)

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Group organization

- 3-4 main teams (team leader +2 PostDoc + PhD students)
  - 1. Molecular Diagnostics
  - 2. Nanomedicine
  - 3. Transdermal Drug Delivery
  - 4. E-tattoo

- Based on Whiteside's group model

- 1 project = 1 paper

- **Group meetings** = 2 times/month
  - Journal Club
  - Progress report for each member
  - Aspects related group organization,

- Start with a review paper

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Research directions

- **Molecular diagnostic**
- **Nanomedicine**
- **Transdermal drug delivery**
- **AI wearables diagnostic & monitoring (eTattoo)**

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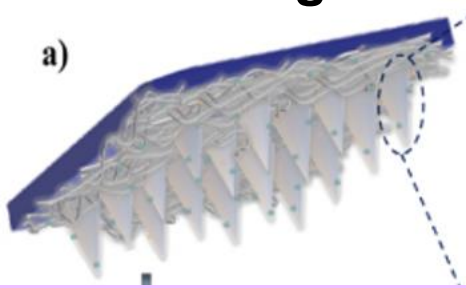
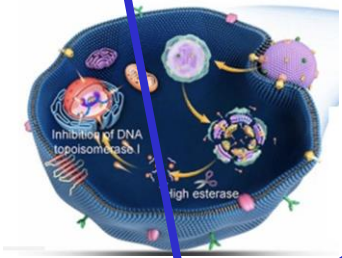
Research directions

Molecular diagnostic

Transdermal drug delivery



Nanomedicine



e-Tatoo

Cell culture

SAW microfluidics

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Molecular Diagnostic

Description

Lab on a chip for early cancer detection and monitoring using liquid biopsy

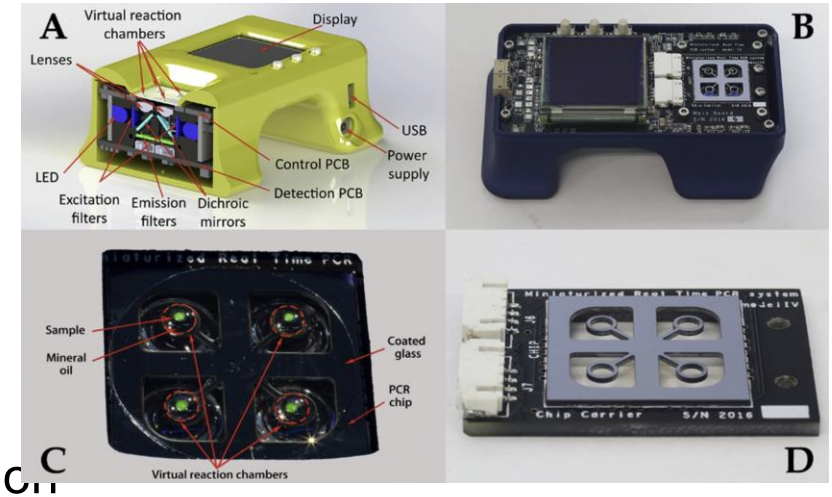
- Microbiota
- Liquid biopsy
- Exosomes (collaboration with Institute for Cellular Biology and Pathology "Nicolae Simionescu")

Team structure

1. Dr. Gratiela Gradisteanu- Group leader
2. PostDoc-biology-genetics
3. PostDoc-bioinformatics

External collaboration:

1. Prof. Luke Lee (Harvard)- Sample preparation
2. Prof. Pavel Neuzil (BTU)- on chip PCR
3. Dr. Min Han Tan (CEO Lucence- liquid biopsy)



IoT PCR developed ic collaboration with Prof P. Neuzil

Nanomedicine/nanocarriers

A. Drug delivery

- Lipid nanocarriers for glioma treatment–

B. Gene delivery

1.PEI- DNA (collaboration with Dr. G. Tresset-CNRS)

2.Peptide DNA (collaboration with A/P K.H. Chan Yale-NUS)

SAW (surface acoustic waves) activated microfluidic device

- $\tau_{mix} \ll \tau_{ad}$
- Increasing loading capacity (?)

SAW device

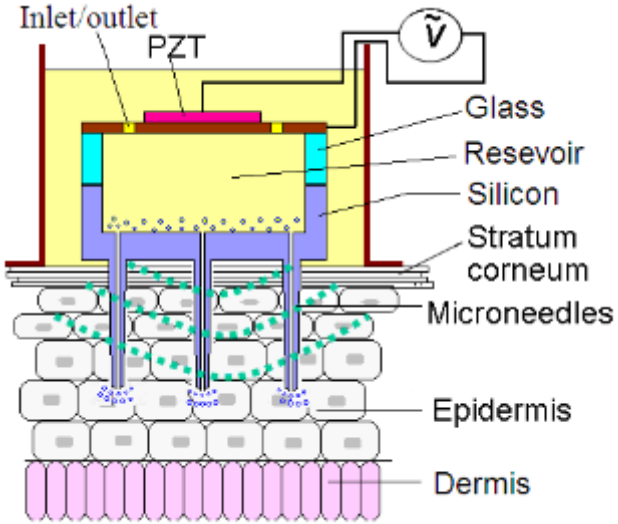
Team structure

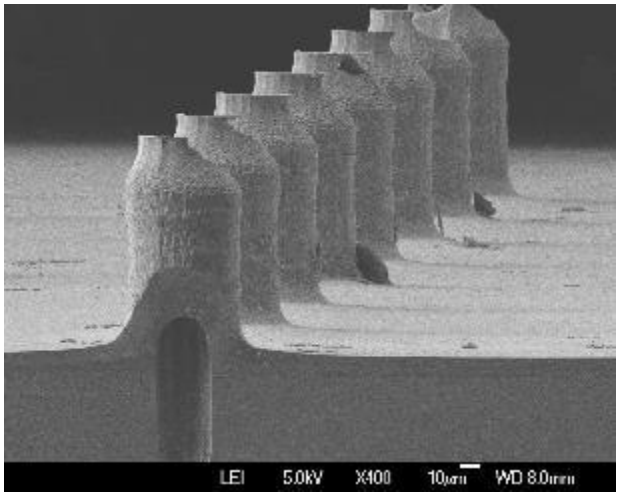
1. Dr. Jana Ghitman-Group leader
2. Post. Doc.- Microfluidics
3. Post Doc- Nanocariers

Transdermal Drug Delivery

Group Leader : Florina Iliescu
2 Post Doc positions (biochemistry)
1 PhD students

Collaborators:
Ryan Donnely – Queens Univ. of Belfast
Lifeng Kang - University of Sydney





1. Surface Acoustic Waves Enhanced Microneedles Patch for Keloid Self-Treatment
2. Smart-knee Guard for Physiologically Controlled Transdermal Drug Delivery for Osteoarthritis (with eTatoo group)
3. Iontophoresis assisted microeedles patch co-delivery of gene and drug (with Nanomedicine group)

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E-tattoo for health monitoring

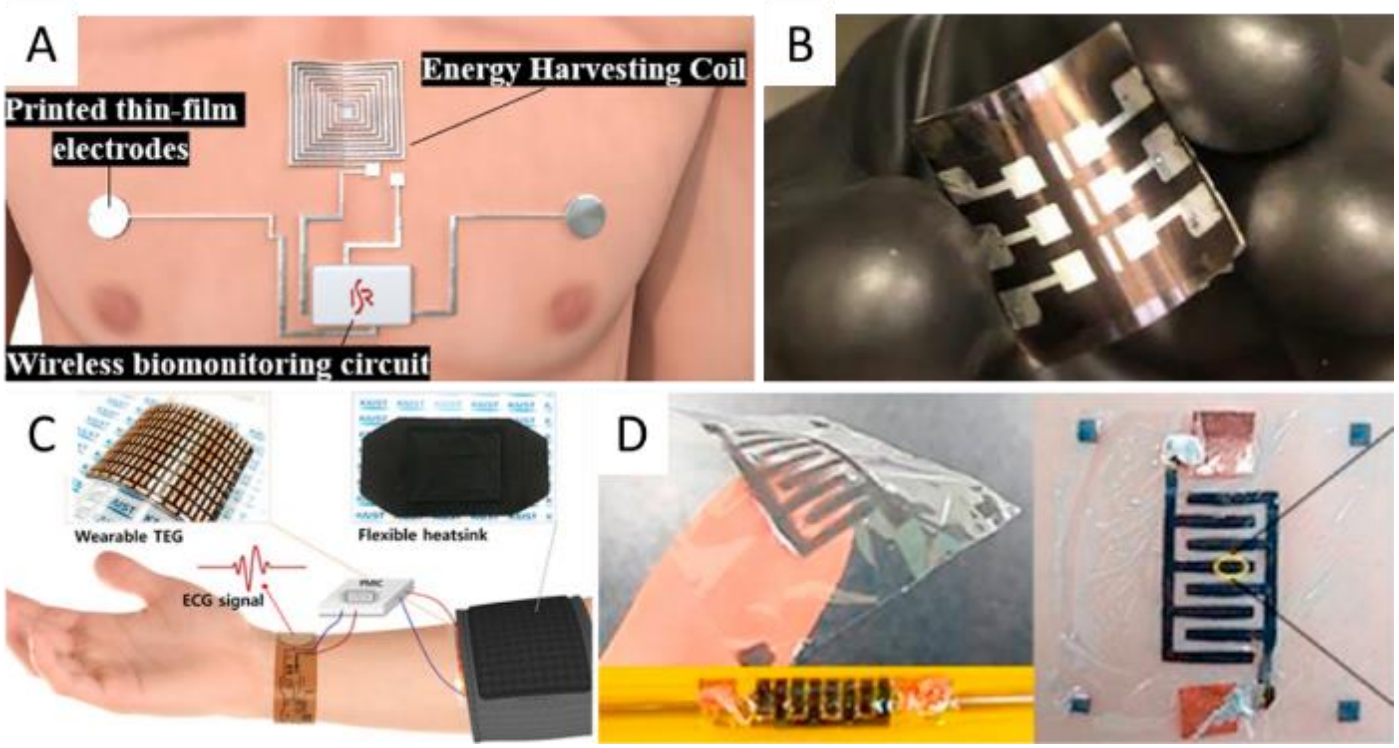

Figure 3. Examples of flexible energy harvesting and storage solutions: (a) wireless power transfer (WPT). Reprinted with permission from [151]; (b) flexible perovskite tandem photovoltaic cells. Reprinted with permission from [155]; (c) self-powered wearable electrocardiography using a wearable thermoelectric power generator. Reprinted with permission from [162]; (d) flexible planar micro-supercapacitor. Reprinted with permission from [174];

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Center of Excellence in Bioengineering

Per aspera ad astra

UNIVERSITATEA NAȚIONALĂ DE ȘTIINȚĂ ȘI TEHNOLOGIE
POLITEHNICA BUCUREȘTI

CERTIFICAT DE EVALUARE PERIODICĂ

Centrul de Excelență în Bioinginerie
(EBIO-HUB)

Facultatea de Inginerie Chimică și Biotehnologii,
Director: Ciprian ILIESCU

este atestat la evaluarea periodică din 2025
pentru a desfășura activități de cercetare în perioada 2025–2029,
cu obligația prezentării anuale a Raportului de Activitate.

15 octombrie 2025

Mihnea COSTOIU
Rector

Bio-hub

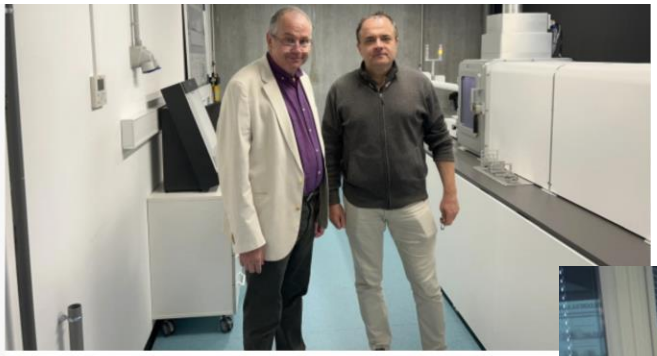
PhD program in Bioengineering

- obtain the provisoral acreditation form ARACIS
- the program will start from 1st October 2026

Hotărârea Consiliului ARACIS nr. 230/H/09.10.2025, privind validarea rezultatelor procedurii de evaluare externă a domeniului de studii universitare de doctorat Bioinginerie.

Autorizatia de functionare provizorie a domeniului de studii doctorale in bioinginerie

Neworking events



eBio-hub team's visit to CNRS Laboratories: Laboratoire de Physique des Solides and Institut Charles Sadron - 15-26 September 2025

eBio-hub team visit to the Laboratoire de Physique des Solides, CNRS, France - 11-15 May 2025

Learning about spin-off in transdermal drug delivery - 14 November 2025

ERA Chair Visit to Graz and Brno – Advancing Collaborative Bioengineering Research - 5-9 October 2025

Summer School: SMART SOLUTIONS FOR REGENERATIVE MEDICINE - 10–11 June 2025, Bucharest, Romania

Funded by the European Union

Thank you for your attention !

ebio-hub.upb.ro

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ebio-hub.upb@gmail.com.

eBio-hub on:

For more information:

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