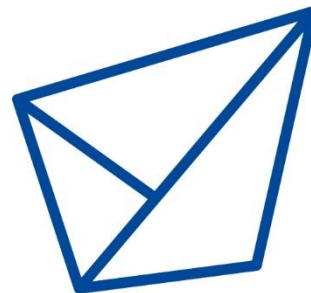


***Dissemination, communication,
and exploitation plan
WP4 (D4.3)***



LEDtech-GROW

***LED TECHNOLOGY BASED ON BISMUTH-SENSITIZED Eu^{3+}
LUMINESCENCE FOR COST-EFFECTIVE INDOOR PLANT
GROWTH***

PROGRAM-PROMIS-2024-2025

Grant Agreement: 10412

Deliverable 4.3

Dissemination, communication, and exploitation plan

Version: 1

Contractual Date Delivery: 01/10/2024

Project Deliverable Information Sheet

LEDtech-GROW Project	Project Ref. No. 10412
	Project Title: <i>LED technology based on bismuth-sensitized Eu³⁺ luminescence for cost-effective indoor plant growth</i>
	Call: Program PROMIS 2023
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	Principal investigator: Dr. BOJANA MILIĆEVIĆ
	Abstract: The dissemination, communication, and exploitation plan provides a strategic framework for effectively promoting the LEDtech-GROW project. It establishes key objectives, identifies critical stakeholders and communication channels, and provides guidelines for communication and dissemination activities. The plan also outlines methods for evaluating the success of these initiatives, allowing for ongoing improvement and impact assessment.

Document Control Sheet

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	Contributed by Jovana Periša
	Approved by Bojana Milićević

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Executive Summary

The presented document constitutes deliverable D4.3 – *Dissemination, communication, and exploitation plan* of the LEDtech-GROW project. It is a public document, delivered in the context of WP4 - *Management, communication, dissemination, and exploitation*, Task 4.2 - *Dissemination, communication, and exploitation of knowledge*.

This document presents the first release of the dissemination, communication, and exploitation plan foreseen in the framework of the LEDtech-GROW project. This comprehensive document outlines the target audiences, topics, and results for sharing and disseminating information related to the LEDtech-GROW project. The main purpose of this plan focuses on raising awareness, facilitating communication, and promoting knowledge sharing to ensure lasting benefits beyond the project's duration.

It details the actions, activities, and tools for collaborative dissemination among the community, ensuring alignment with both the project objectives and the specific activities of each work package. In addition, the document presents developed and planned dissemination activities, highlighting potential academic events and journals for future engagement.

The content of this document is complementary to other official documents that define obligations under the Grant Agreement (GA) and shall be considered a living document and as such will be the subject of periodic updating as necessary throughout the lifespan of the Project. The final version of the *Dissemination, Communication, and Exploitation Plan* will be made available when the project nears completion.

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Abbreviations and Acronyms

Explanation

[DCE]	Dissemination, Communication, and Exploitation
[EU]	European Union
[GA]	Grant Agreement
[Gold Open Access]	Open access publishing (gold open access) means that an article is immediately provided in open access mode on the publisher or journal's website. Some publishers charge Article Processing Chargers (APCs) to make articles open.
[Green Open Access]	Self-archiving (green open access) means that a published article or the final peer-reviewed the manuscript is archived (deposited) in an online repository before, alongside, or after publication. In some cases, the author can delay access to the article (embargo period). H2020 rules state that embargo periods cannot exceed six months, except for publications in social science and humanities where the maximum embargo period is twelve months.
[IPR]	Intellectual Property Rights
[LEDtech-GROW]	Acronym of the Project Titled " <i>LED technology based on bismuth-sensitized Eu³⁺ luminescence for cost-effective indoor plant growth</i> "
[PAR]	Photosynthetically active radiation (400–700 nm of wavelength), an essential part of the light spectrum which typically drives photosynthesis more efficiently at the red and blue regions of the spectrum
[PI]	Principal Investigator
[PROMIS 2023]	The Program for Excellent Projects of Young Researchers (PROMIS) is a program of the Science Fund of the Republic of Serbia intended of excellent projects for young researchers in the early phase of their careers
[VinaR]	VinaR, i.e. Vinca Repository is a joint digital repository of all laboratories and departments in Vinča Institute of Nuclear Sciences, University of Belgrade. VinaR provides open access to the publications, as well as other outputs of the research projects implemented in these institutions.
[VINS]	"Vinča" Institute of Nuclear Sciences – National Institute of the Republic of Serbia, University of Belgrade
[WP]	Work package
[Zenodo]	Zenodo is a catch-all research data repository that enables researchers, EU projects

1. Introduction

LEDtech-GROW – “LED technology based on bismuth-sensitized Eu^{3+} luminescence for cost-effective indoor plant growth” is a Science Fund of the Republic of Serbia funded project (Program PROMIS 2023, Grant Contract No. 10412) coordinated and completely executed by “Vinča” Institute of Nuclear Sciences – National Institute of the Republic of Serbia, University of Belgrade (VINS). The project will run from January 3rd, 2024 to January 2nd, 2026.

LEDtech-GROW is a highly ambitious and innovative project that aims to achieve a breakthrough in modern, efficient, and moisture-resistant plant-grow-targeted LED illumination as a key solution for successful future artificial indoor agriculture production. LEDtech-GROW offers innovation in the field of LEDs that entirely satisfy the needs of plants and cannot be achieved with any currently available LED technology. This project will develop inorganic phosphors that convert as much electrical energy as possible into a Photosynthetically Active Radiation (PAR) spectrum of plant photoreceptors, which differs from one required for general lighting. Particularly, double- and triple-wavelength-emitting phosphors increase light output for cryptochrome and phytochrome photoreceptors while ensuring high color quality will be produced. The fundamental concept of inner-particle energy transfer between Bi^{3+} and Eu^{3+} ions significantly contributes to developing plant-grow-targeted LEDs. Moreover, the LEDtech-GROW project will focus on the design and fabrication of highly efficient plant-grow-targeted LEDs based on bismuth-sensitized Eu^{3+} -activated single-component phosphors for the whole PAR spectrum.

LEDtech-GROW project comprises two technical work packages as follows:

- ❖ WP1 Design, synthesis, and characterization of plant-grow-targeted phosphors
- ❖ WP2 Design, fabrication, and LEDs performance

Two non-technical work packages ensure the facilitation of the technical work, coordination of all the work packages, dissemination, and communication of the project results. These work packages consist of the following:

- ❖ WP3 Professional development of young and early-stage researchers
- ❖ WP4 Management, communication, dissemination, and exploitation

The present document – D4.3 - Dissemination, Communication, and Exploitation Plan is a deliverable of WP4 that will be established and monitored by the PI and WP leaders (TM1, TM2, and TM3 team members). The primary aim of this document is to establish a comprehensive dissemination plan for the LEDtech-GROW project while providing clear guidelines for all project members. Herein, the activities will include effective dissemination raising awareness, facilitating communication, promoting knowledge sharing and technology transfer, exploring commercial opportunities, and identifying potential companies interested in using LEDs for plant cultivation.

Our strategy emphasizes the importance of building strong relationships with a diverse range of stakeholders, including industry partners, academic institutions, and the broader community. Additionally, we are committed to effectively communicating the project’s outcomes and actively seeking feedback from these audiences.

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Creating a cohesive identity for the project will help ensure that our messaging resonates with various groups and enhances the project's visibility. Given the dynamic nature of dissemination activities, it is essential to update and adapt the plan regularly. The Dissemination and Communication (DCE) Plan will serve as a living document, remaining current even after its formal delivery. This collaborative approach will engage all project members in actively contributing to our dissemination efforts.

We will continuously monitor and report on these activities throughout the project's lifecycle, ensuring that we remain responsive to emerging opportunities and feedback. By focusing on these principles, we aim to maximize the impact of the LEDtech-GROW project and ensure its long-term relevance in the field.

Our dissemination efforts are focused on two specific objectives:

- *Awareness Creation and Communication:* We aim to effectively raise awareness about the project, ensuring that results are communicated clearly to a wide range of audiences. This will involve disseminating information through multiple channels and fostering dialogue to maximize the reach and impact of our findings.
- *Knowledge Sharing and Stakeholder Engagement:* Promoting active engagement with stakeholders is essential for ensuring the sustainability of the project's impacts beyond its duration. This includes facilitating knowledge transfer and collaboration, thereby creating a network of interested parties who can continue to utilize and build upon the project's outcomes.

By concentrating on these objectives, we aspire to enhance the visibility of the LEDtech-GROW project while ensuring its long-term relevance and application within the field.

2. Dissemination Plan

Dissemination refers to the public sharing of research results through various appropriate channels, including scientific publications in multiple formats. A well-crafted dissemination plan facilitates the transfer of knowledge and findings to stakeholders who can leverage them most effectively. This approach maximizes the impact of research, allowing the benefits to extend beyond the initial focus while preventing results from becoming overlooked.

Dissemination pertains to the communication of all results that are not constrained by intellectual property protections. One of the primary goals of the LEDtech-GROW project is the development of scientific and technological leadership in the field of inorganic nanomaterials and LED devices. This will be achieved through a targeted and diverse dissemination of project results to the scientific community.

Planned Dissemination Activities: The overarching goal of our dissemination efforts includes promoting knowledge, raising public awareness, fostering education, and enhancing transparency. Effective dissemination also encompasses how communication is executed, the intended audience, and the methods employed. Our strategy aims to highlight the social impact and exploitation of the project's potential to the general public, scientific and industrial communities.

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To effectively communicate the project's outcomes, we must consider the specific needs (including language, methods, and content) of each target audience. Table 1 summarizes the planned dissemination actions for the LEDtech-GROW project, tailored to various audiences and the messages we aim to convey.

Table 1: Dissemination activities

ACTIVITIES	TARGET AUDIENCES	INDICATORS
Website	The scientific community, the general public, stakeholders, academia	Number of visitors
Logo	The scientific community, the general public, shareholders, academia	Logo recognition
Leaflet	The scientific community, the general public, shareholders, academia	Contact requests, demonstrations of interest
Social media	The scientific community, the general public, shareholders, academia	Number of followers
Press releases and public outreach (magazines, radio, TV)	The scientific community, the general public, shareholders, academia	Number of appearances, number of interviews, speeches
Publications in peer-reviewed journals	Scientific community	Impact factor, citations, downloads
Scientific Events: conferences, lectures, seminars	Scientific community, general public, shareholders, academia	Number of invited talks, oral presentations and posters
Public Events: Fairs, Researchers' Night	Scientific community, general public, shareholders, academia	Contact requests, demonstrations of interest
Roll-up (s)	Scientific community, general public, shareholders, academia	Contact requests, demonstrations of interest

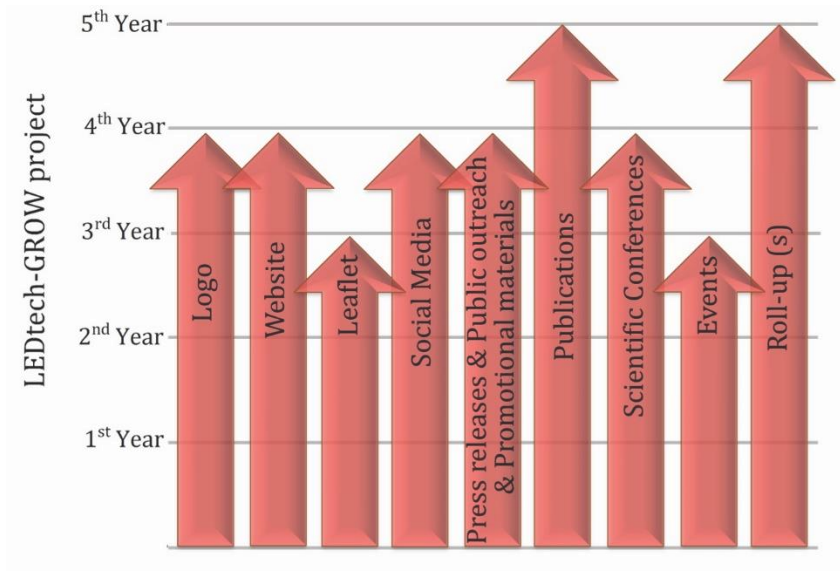


Figure 1. Roadmap of dissemination actions of LEDtech-GROW.

3. LEDtech-GROW Logo

The dedicated LEDtech-GROW logo (Figure 2) was launched during the early Project stage (D4.1, M1). A specific logo was designed to give a visual identity to the project and is systematically used in all the promotional and dissemination actions of the project, including our website, presentations, posters, communications, and documents.

The logo can be downloaded directly from the website or requested by direct contact with the project’s principal investigator (Dr. Bojana Milićević) or data manager (TM5) (Katarina Milenković).



Figure 2. LEDtech-GROW project logo.

To ensure a consistent style, format, and identity for the project, template files for Microsoft PowerPoint and Word documents (Annex I) have been produced and will be utilized in all dissemination activities.

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4. Project Website

The dedicated LEDtech-GROW website (<https://ledtechgrow-promis.org/>, Figure 3) was launched during the early Project stage (D4.1, M2). The website is the main communication platform of LEDtech-GROW activities comprising basic information targeted to the public and specific information devoted to the stakeholders linked to the project.

The website is of primary importance due to the expected impact on the target audiences. The website contains mainly public deliverables, brochures, posters, presentations, scientific papers, newsletters, magazine articles, videos, photos, open-access scientific papers, etc. The project website will not include confidential deliverables when the main exchange of these data will be among the Project team members. It was designed to provide quick, simple, and useful information, serving as a dynamic and interactive tool to ensure clear communication and broad dissemination of project news, activities, and results.

The website is regularly updated with news and events related to the LEDtech-GROW Project. The LEDtech-GROW website will be live throughout the project and for at least a year after it ends. It is available in English.

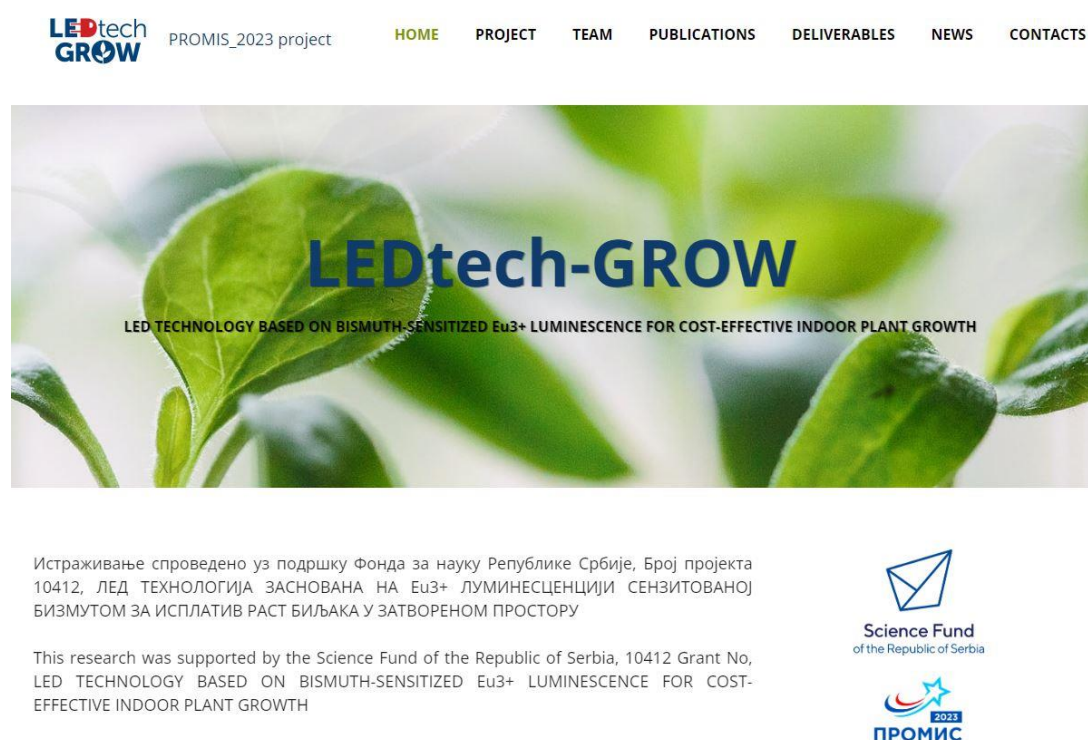


Figure 3. LEDtech-GROW project website.

The website was designed to reach a larger community from scientists to the general public interested in luminescence, nanomaterials, and LED technologies. Key features of the website include:

- **Homepage Overview** – This page offers a comprehensive overview of the project, detailing its objectives, the funding organization, and the key team members involved. It also provides links to our social media channels, specifically LinkedIn and Instagram, for updates

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on progress. Additionally, contact information is available for any further inquiries or requests for information.

- **Project Overview** – This page provides a comprehensive overview of the project, including its objectives and detailed descriptions of the work packages.
- **Team Overview** – This page introduces the LEDtech-GROW team members, highlighting their research positions, backgrounds, and areas of expertise.
- **Publication Overview** – This page includes publications related to the project and will be regularly updated.
- **Deliverable Overview** – This page includes deliverables along with direct links for easy access.
- **News Overview** – This page presents project outputs, news updates, newsletters, meetings, conferences, and events along with direct links for easy access.

Contact Overview – This page presents the contact details of LEDtech-GROW for any further inquiries or requests for information.

Guidelines: The PI (also WP4 leader) hosts and manages the website, which is meant to be maintained for at least one year after the project's completion, or until the host considers it relevant and valuable. Commercial analytic applications may be used to monitor website visitors.

5. Leaflet

During the early Project stage (D4.1, M3), we crafted a triplet format page (see Annex II) designed as an informative leaflet for distribution among partners. This leaflet will be utilized at various events, including scientific conferences, trade exhibitions, fairs, educational outreach in schools, and professional showcases. Its primary aim is to convey detailed information about the project's aims, execution strategies, and expected results to a broad audience.

This leaflet is crucial to enhancing project visibility among the general public. It provides context regarding the initiative, underscores its importance, and includes vital contact details and links to the project's official website. By presenting this information engagingly and clearly, we seek to captivate public interest and encourage involvement in the project's goals and activities. The leaflet must be accessible at all pertinent events associated with the project to maintain consistent communication and outreach.

Guidelines: The leaflet is provided in electronic and paper formats to ensure effective dissemination. A PDF version of the leaflet is available in a specific area of the project website (Deliverable page). The LEDtech-GROW leaflet will be disseminated at events and on social media, raising awareness and enthusiasm among the general public and stakeholders, including academic institutions or industry experts. This will facilitate easy access for partners, enabling them to share the material digitally and broaden its reach.

Significance of the Leaflet:

The leaflet functions as a promotional tool and a crucial element of our outreach strategy. By circulating this leaflet, we aim to enhance understanding of the project's influence and significance, fostering stakeholder dialogue and collaboration. It will also serve as a vital resource for addressing inquiries and clarifying the project's objectives and methodologies.

In summary, the active distribution of this leaflet will substantially elevate the profile of the LEDtech-GROW project. By engaging a diverse audience and delivering clear, accessible information, we can encourage wider participation and interest, ultimately contributing to the project's sustained success.

6. Social Media

LEDtech-GROW project is present on social media/networking *via* a dedicated LinkedIn ([//www.linkedin.com/company/ledtech-grow?trk=public_post_follow-view-profile](https://www.linkedin.com/company/ledtech-grow?trk=public_post_follow-view-profile)), and Instagram ([//www.instagram.com/ledtech.grow?igsh=MTVueDMONzlOZ2VmNg==](https://www.instagram.com/ledtech.grow?igsh=MTVueDMONzlOZ2VmNg==)). The main purpose of using these social media is to reach wide visibility within the scientific community, institutional and industrial sectors.

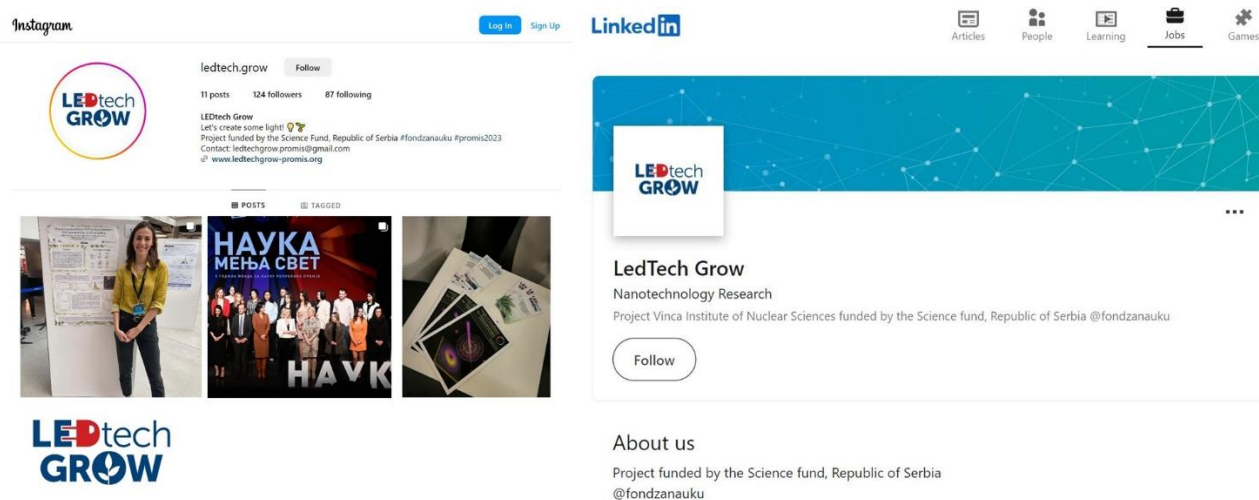


Figure 4. LEDtech-GROW on social media

Guidelines: All social media accounts, including LinkedIn and Instagram, have been established by WP4 to promote the project effectively. Team members are encouraged to share and forward relevant information, updates, and content that can enrich these channels. By contributing engaging posts, articles, and multimedia, team members can help enhance visibility and foster a sense of community around the project.

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7. Press Releases and Public Outreach

Project updates will be shared regularly through multiple channels, including the project website, local newspapers, magazines, institutional social media, and more. Specific press releases will keep the general public and scientific or industrial communities updated about the project's goals and outcomes. This multi-channel approach will maximize visibility and engagement with diverse audiences.

We will also promote public awareness of innovative LED technology designed for plant growth in indoor environments and its societal impact through various initiatives. For example, we participated in the 15th European Researchers' Night and the 66th International Fair of Techniques and Technical Achievements. These public promotion efforts are crucial for establishing future technological partners and advancing knowledge and science. Furthermore, an article presenting the main objectives of the LEDtech-GROW project (Annex III) was published in Movem magazine in May 2024 ([//www.movem.rs/images/posts/pdf/movem-magazin-devetnesti-broj106.pdf](http://www.movem.rs/images/posts/pdf/movem-magazin-devetnesti-broj106.pdf)).

Guidelines: WP4 will draft press releases related to major events organized by team members. These press releases will be uploaded to the website and disseminated through selected channels. When writing a press release, team members must adhere to a specific format that includes the date, an eye-catching headline, LEDtech-GROW logo, the Science Fund emblem, and contact details for further inquiries.

8. Other Promotional Materials

Effective promotional materials for project dissemination, such as brochures, posters, or roll-up(s), are essential for several reasons. They raise awareness about the project, engage stakeholders, and communicate key findings and benefits. Well-designed materials capture attention, simplify complex information, and foster collaboration by inviting others to support the initiative. Finally, comprehensive distribution activities increase the project's impact and sustainability, ensuring valuable insights will reach a larger audience.

Additional promotional materials will be developed as needed. For example, a poster presentation designed specifically for the youth population (Annex IV) was created for the 15th European Researchers' Night that was held in Belgrade on September 27, 2024.

Guidelines: Other promotional materials, such as posters or roll-ups, will be utilized to showcase our project research at public meetings, fairs, and various events. Each material will be tailored specifically for each event. This targeted approach will enhance audience engagement and effectively communicate our key messages, fostering greater awareness and collaboration around our project.

9. Scientific Publications and Peer-Reviewed Journals

The LEDtech-GROW's results will be communicated to the scientific community mainly through publication in peer-reviewed journals. The target journals will be fundamental and applied in the following areas: physics, chemistry, materials science, and nanotechnology, as well as in journals with an agriculture audience. The LEDtech-GROW will follow the GA rules on open-access publications (Gold or Green). Open-access publications will be available through the project website and deposited into the institutional repository (VinaR.vin.bg.ac.rs), while the research data will be uploaded to the Zenodo.org repository, according to the Data Management Plan.

To date, LEDtech-GROW team members have already submitted three scientific manuscripts (Annex V), it is expected that the scientific production will increase during the upcoming years of the project. Annex V will be updated accordingly.

Guidelines: All publications, all communications (posters, oral presentations in conferences), leaflets, and any other promotional material made by LEDtech-GROW scope, must acknowledge the funding contribution of the Science Fund of the Republic of Serbia, using the following sentence: "This research was supported by the Science Fund of the Republic of Serbia, #GRANT No 10412, LED technology based on bismuth-sensitized Eu^{3+} luminescence for cost-effective indoor plant growth - LEDTECH-GROW."

10. Events

A crucial dissemination action is the organization or participation in events or meetings. The LEDtech-GROW team members will participate in national and international meetings (targeted academic and industrial communities) following the updates in the field. Specialized events, such as scientific congresses, training events, and general public events (e.g., Fairs, Researcher's Night, etc.), are a way to reach a specialized audience and provide good opportunities for knowledge exchange between scientists or industrial exhibitors. The main objective of congresses and training events is knowledge dissemination among the scientific community, while general public events or industrial events are more specific to target the general public and relevant stakeholders, respectively.

So far, LEDtech-GROW members have attended several international conferences, trainings, and general public events (see Annex VI). Our primary goal is to provide young scientists with not only significant knowledge and expertise in the LEDtech-GROW research areas, but also essential skills in Horizon project preparation, writing, and management, as well as important aspects of patent protection and intellectual property rights.

Guidelines: All team members are required to inform the principal investigator about their event attendance and provide details regarding their participation. An annual meeting will be held, allowing all team members to convene, review results, and strategize for the upcoming months of the project.

11. Exploitation Plan

Definition: Exploitation focuses on leveraging the project's results at various levels throughout and after its implementation. It involves key actions to increase the project's visibility and engage target groups, end-users, and stakeholders, facilitating the integration of outcomes into their professional practices. A primary goal of exploitation is to encourage key actors to use the project's main products. Additionally, it plays a crucial role in ensuring the project's sustainability post-completion, as these efforts should promote the effective use of results by the target audience and allow for their application in different contexts, such as other countries, educational or industrial sectors, or fields.

The LEDtech-GROW project aims to develop innovative inorganic nanophosphors for LED technologies, primarily targeting indoor farming and greenhouse applications, with a significant societal impact. This initiative addresses key challenges in sustainable agriculture, enhancing plant growth and resource efficiency. The project has distinct exploitation interests, focusing on knowledge transfer to disseminate research findings effectively, while also committing to industrialization and commercialization to bring these innovations to market. A comprehensive exploitation strategy should be anticipated on how main results, tools, or products can best be used and exploited within the field to which this project is intended.

The project members will be the primary users of the project results, leveraging them through their initiatives or by facilitating exploitation by others, such as making results available under open licenses. Key activities to support this include innovation management, copyright management, developing data management plans, and engaging stakeholders and users. To achieve these goals, common tools may involve patent publications, the establishment of spin-off or start-up companies, licensing practices (including open options), and using the results for academic purposes, such as in PhD research.

IPR Management: The LEDtech-GROW team will participate in specialized IPR management training designed to empower members to pursue patents and protectable innovations. This training will cover various aspects of IP, including the types and statuses of IP (both Background and Foreground) and different exploitation strategies such as patents, licenses, and other protection mechanisms. Regular updates and discussions will ensure that all team members are aligned on IP strategies and responsibilities.

Guidelines: IPR management includes analyses on the intellectual property that is needed or that will be brought to the project (e.g., knowledge and inventions). Every team member is asked to communicate if there is something exploitable in the foreground so that IP protection measures such as patents or trademarks can be implemented. For this purpose, reporting forms will be elaborated and made available upon reasonable request, but will not be available for download from the LEDtech-GROW website. In principle, these reports should contain the following information:

- Identification of specific contribution/role in the development
- Identification of IPR type
- Status of IPR: Exploitation Forms (type and owner) e.g., direct industrial use, patenting, technology transfer, license agreement, publications, standards, etc.
- Partner/s involved expectations

- Confidentiality (Yes/No)
- Innovativeness compared to already existing Products
- Competitive advantages
- Product Positioning Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)
- Cost of Implementation (before Exploitation)
- Sources of financing foreseen after the end of the project (for example other grants, etc.)

To maximize the commercial potential of their innovations, LEDtech-GROW team members may conduct a comprehensive market analysis if needed. This analysis will identify:

- *Target Market Size and Trends:* Understanding market demand, growth potential, and emerging trends in LED technologies for agriculture.
- *Potential Partners and Customers:* Identifying key stakeholders, including agricultural producers, greenhouse operators, and technology integrators who can benefit from these advancements.
- *Competitors and Competitive Advantages:* Analyzing existing competitors, their technologies, and positioning to determine how LEDtech-GROW's innovations can offer distinct advantages.

Indicators for Progress: To effectively monitor the implementation of the Exploitation Plan, the project will track several key indicators. These include participation in relevant industrial events, such as conferences, trade shows, and fairs focused on agriculture and LED technologies, to build networks and promote project outcomes. Additionally, attendance at training and informational workshops will be measured to enhance knowledge and skills related to commercialization strategies. Finally, the project will monitor potential patent applications and licensing agreements, here patents filed and agreements established may be indicators of successful intellectual property management.

Following the conclusion of the project, LEDtech-GROW's results are expected to stimulate new collaborative research initiatives, particularly focusing on LED applications for plant growth and sustainability. Continued engagement with industry stakeholders and researchers will be essential to fostering ongoing collaboration and enhancing the commercialization of the project's outcomes.

12. Annexes

Annex I

Microsoft Word (a) and Microsoft PowerPoint (b) documents created to be used in LEDtech-GROW Project

File: LEDtechGROW\10412 - 01/07/2024

Deliverable title
WPX (DX.Y)





LEDtech-GROW
LED TECHNOLOGY BASED ON BISMUTH-SENSITIZED
Eu³⁺ LUMINESCENCE FOR COST-EFFECTIVE INDOOR
PLANT GROWTH

PROGRAM-PROMIS-2024-2025
Grant Agreement: 10412

Deliverable DX.Y
(Deliverable title)
Version: ____
Contractual Date Delivery: (date)

a)



DX.Y Deliverable title

Version: Date:

Project Deliverable Information Sheet

LEDtech-GROW Project	Project Ref. No: 10412
	Project Title: LED technology based on bismuth-sensitized Eu ³⁺ luminescence for cost-effective indoor plant growth
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	Deliverable Type:
	Month of delivery:
	Contractual Delivery Date:
	Actual Delivery Date:
	Principal investigator: Dr. BOJANA MILICEVIC
	Abstract: Brief description of the report document.

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Page: 2



LED TECHNOLOGY BASED ON BISMUTH-SENSITIZED Eu³⁺ LUMINESCENCE FOR COST-EFFECTIVE INDOOR PLANT GROWTH






<https://ledtechgrow-promis.org/>
ledtechgrow.promis@gmail.com




PROGRAM-PROMIS-2024-2025
Grant Agreement: 10412

This project is supported by the Science Fund of the Republic of Serbia

b)

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Annex II

Leaflet, deliverable D4.1 (WP4), April 2024

PROJECT FLOW

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**LED TECHNOLOGY BASED ON
 BISMUTH-SENSITIZED
 Eu³⁺ LUMINESCENCE FOR COST-
 EFFECTIVE INDOOR
 PLANT GROWTH**

PROJECT

In light of global urbanization, the key to long-term agricultural development is a more efficient use of arable land, labor, and modern technology.

Indoor plant factories are promising solutions for future horticulture production and food supply to densely populated urban areas. The light-emitting-diode (LED) is revolutionizing general illumination with the promise of enormous energy savings when widespread adoption occurs.

However, current LED technologies for plant cultivation are less developed compared to LEDs for general lighting. LEDtech-GROW offers innovation in the field of LEDs that entirely satisfy the needs of plants and cannot be achieved with any LED technology currently available.

We will develop inorganic phosphors that convert as much electrical energy as possible into a Photosynthetically Active Radiation (PAR) spectrum of plant photoreceptors.

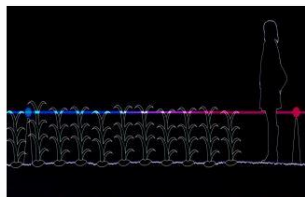


Objective 1

The development of high-efficient and moisture-resistant plant-grow-targeted single-component phosphors based on double- and triple-wavelength emission for the whole PAR spectrum.

Site substitution engineering will be implemented via suitable and efficient energy transfer between Bi³⁺→Eu³⁺ to adjust the multi-color emission of phosphors.

A unique green synthesis based on environmentally acceptable components will be used.



LEDtech-GROW project results will contribute to the development of improved inorganic phosphors and LED technologies for other applications where efficient, high-quality lighting is crucial.

The focus is on the issues in the field of materials science, such as resemblances of emission spectra of phosphors to the PAR spectrum of plant photoreceptors and fabrication of novel generation of plant-growth-LEDs.

Objective 2

The fabrication of LED devices based on dual- and triple-wavelength emitting single-component phosphors.

To fabricate the pc-LEDs, two distinctive strategies will be employed:

1. The novel LED chip-on-board fabrication strategy that combines near-UV semiconductor chip and representative triple-wavelength emitting plant-grow-targeted single-component phosphor, and
2. A strategy that combines blue semiconductor chips and representative red and far-red double-wavelength emitting single-component phosphors, which is a common way of white LEDs chip-on-board fabrication.

The outcomes of this project activity can be used to develop new innovative technologies beyond the proposed LED technology for artificial indoor plant growth.



Истраживања је спроведено у подршку Фонда за науку Републике Србије, 10412. LED TECHNOLOGY BASED ON BISMUTH-SENSITIZED Eu³⁺ LUMINESCENCE FOR COST-EFFECTIVE INDOOR PLANT GROWTH – LEDTech-Grow
 This research was supported by the Science Fund of the Republic of Serbia, 10412. LED TECHNOLOGY BASED ON BISMUTH-SENSITIZED Eu³⁺ LUMINESCENCE FOR COST-EFFECTIVE INDOOR PLANT GROWTH – LEDTech-Grow
 Овај лист је сачињен уз финансијску подршку Фонда за науку Републике Србије. За садржину ове публикације искључиво је одговоран Институт за нуклеарне науке Винча, Институт од националног значаја за Републику Србију, и та
 одговоран не изражава ставове Фонда за науку Републике Србије.
 This leaflet was created with the financial support of the Science Fund of the Republic of Serbia. Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia, is solely responsible for the content of this publication, and this content does not
 express the views of the Science Fund of the Republic of Serbia.

Annex III

Article published in Movem magazine, May 2024.

MLADE NAUČNICE / IZ SRBIJE KOJE MENJAJU SVET

YOUNG FEMALE SCIENTISTS FROM SERBIA WHO CHANGE THE WORLD

Author / Author: ASHOK MURTY
Fotografija / Photo: KATARINA SOŠKIĆ
Likovnja / Layout: SMOKVICA

IMENA Bojana Mičević, Marina Stamenković i Jelena Velić su verovatno vam ne zvuče poznato. Čreška, velika gradonačelnica (za parafraziranje na Vajen iz kulturnog filma „Zgodna žena“ koju je interpretirala Džulija Roberts). A za to što smo odučili da ih (više nego zasluženo) gamerno pod reflektore zaslužan je Fond za nauku Republike Srbije koji nastavlja svoju predanost podršci mladih istraživača kroz Program za izvanne projekte mladih istraživača i naučnica u ranoj fazi karijere – PROMIS 2023 u okviru kojeg će u naredne dve godine finansirati 30 projekata sa ukupnim budžetom od 4 miliona evra. Program PROMIS 2023 uključuje 156 naučnika iz 42 naučnoistraživačke organizacije u Srbiji. Ovi projekti ne samo da jačaju kapacitete mladih naučnika, već i grade temelje za njihovu buduću konkurentnost na globalnom nivou doprinoseći razvoju nauke kako u Srbiji, tako i u svetu. Odučili smo da ove tri mlade naučnice, koje se pre ovog nisu ni poznavale, okupimo na jednoj čajnici na kojoj su jedina druga pokušale da predstavljaju projekte.

BOJANA, NA ŠTA SE ODNOSI TVOJ PROJEKT, UKRATKO?

Bojana: U skladu sa stalnim rastom svetске populacije i sve manjom obradivom zemljištu, poljoprivreda se suočava sa izazovima koji zahtevaju inovativna rešenja. Upravo u tom kontekstu, projekat LED-Tech-GROW predstavlja tehnologiju koja koristi neorganske fosfore kako bi stvorila svetlosti koja direktno doprinosi rastu biljaka, povećanju prinosa i očuvanju biodiverzitetne sredine.

THE NAMES of Bojana Mičević, Marina Stamenković and Jelena Velić probably do not sound familiar to you. Big mistake! Big! To paraphrase the character of Helen interpreted by Julia Roberts in the iconic film “Pretty Woman”. And the fact that we decided to (more than deservedly) push them under the spotlight is due to the Science Fund of the Republic of Serbia, which continues to be dedicated to supporting young researchers through the Programme for Excellent Projects of Young Researchers and Scientists in the Early Stage of Career – PROMIS 2023, within which in the next two years, it will finance 30 projects with a total budget of a million euros. The PROMIS 2023 Programme brings together 156 scientists from 42 scientific research organisations in Serbia. These projects...

BOJANA, WHAT IS YOUR PROJECT ABOUT, IN A NUTSHELL?

Bojana: In accordance with the constant growth of the world's population and the decreasing amount of arable land, agriculture is facing challenges that require innovative solutions. It is in this context that the LED-Tech-GROW project presents a technology that uses inorganic phosphorus to create light that directly contributes to plant growth, yield increase and environmental protection.

A ČIME SI SE TI BAVILA, JELENA?

Jelena: Većina proizvedenog poljoprivrednog otpada transportuje se na deponije ili spaljuje na otvorenim mestima, obojujući gasove staklene bašte u našu atmosferu i lokalni krajolik. Kod nas u zemlji i regionu je česta praksa da se spaljuju njive otvorenim plamenom, upravo u takvim i sličnim procesima se dobija biogazni materijal koji se dobija od poljoprivrednih ostataka. Manji deo nastalog poljoprivrednog otpada se iskoristi u stočarstvu, za loženje, ili za proizvodnju briksa/pelleta, a još manji deo se kompostira, podvrgavaju anaerobnoj digestiji (proizvodnja biogasa) ili pirólizi.

A TI, MARINA, U ŠTA SI SE TI UPUSTILA KROZ SVOJ PROJEKTAT?

Marina: U sklopu projekta REDIRECT istraživački tim u Srbiji započeo je istraživanje procesa autofagije i njegovog

Jelena: Most of the produced agricultural waste is transported to landfills or it is incinerated in open areas, releasing greenhouse gases into our atmosphere during decomposition in our country and the region. It is a common practice to burn fields with an open flame, and in such and similar processes that biogas is generated - material obtained from agricultural residues. A smaller part of the generated agricultural waste is used in animal husbandry for burning, or for the production of briquettes/pellets, and an even smaller part is composted subjected to anaerobic digestion (biogas production) or pyrolysis.

Jelena: Ukoliko koristimo pirólizu da transformišemo otpad biomase u biogaz] umesto da ga ostavimo po strani da se razgradi, ekološki problemi se mogu ublažiti dok se proizvode korisni materijali i energija. Piróliza je termičko razlaganje ugljeničnih materijala u okruženju bez kiseonika na visokim temperaturama, između 600 i 900 stepeni Celzijusa, a to nije isto što i sagoravanje ili spaljivanje. Moje koleginice i ja, kroz ovaj projekat, pokušavamo da koristimo poljoprivredni otpad proizvedeno biogaz, da rad u laboratoriji optimizujemo na lakši način da se što manje rastvarača koristi u procesu proizvodnje i da na kraju tom biogazu damo dodatnu vrednost koristeći ga kao inovativni materijal u senzorici i određivanju pesticida u vodama. Ova istraživanja su ključna ne samo za razvoj senzoriske tehnologije, već i za podizanje nivoa svesti o klimatskim promenama i održivom korišćenju resursa. Upotreba biogaza može doprineti poboljšanju kvaliteta zemljišta, smanjenju emisije štetnih gasova i smanjenju upotrebe pesticida.

BOJANA, VERUJEM DA SE NEĆE I PREKLAPAMO U NAČINU NA KOJI RAZMIŠLJAMO O OVOJ PROBLEMATICI.

JELENA, WHAT CAN WE, AS A SPECIES, REALLY DO REGARDING OUR CONTRIBUTION TO THE GLOBAL WARMING PROBLEM?

Jelena: If we use pyrolysis to transform biomass waste into biogas instead of leaving it aside to decompose, environmental problems can be mitigated while producing useful materials and energy. Pyrolysis is the thermal decomposition of carbon materials in an oxygen-free environment at high temperatures, between 600 and 900 degrees Celsius, which is not the same as burning or incineration. Through this project, my colleagues and I try to use agricultural waste to produce biogas, to optimize the work in the laboratory in such a way that as few solvents as possible are used in the production process, and in the end to give that biogas additional value by using it as an innovative material in sensor technology and determination of pesticides in water. These researches are crucial not only for the development of sensor technology, but also for raising awareness of climate change and sustainable use of resources. The use of biogas can contribute to improving the quality of the soil, reducing the emission of harmful gases and reducing the use of pesticides.

potencijalnog uticaja na isporuku, transport i imunski odgovor prilikom primene RIK vakcine. Ovo istraživanje postavlja temelje za buduća istraživanja i konkurentnost zemlje u svetu istraživanja u ovom domenu. Istraživanje sprodi tim sastavljen od stručnjaka iz Instituta za nuklearne nauke Vinkovci, Instituta za virusologiju, vakcine i serume „Torlak“ i Fakulteta za fizičku hemiju. Pored naučnog značaja, ovo istraživanje ima i širu društvenu korist. Informisanje javnosti o karakteristikama i sigurnosti ovih vakcina može doprineti povećanju obuhvata imunizacije, što je ključno za zaštitu najvulnerabilnijih kategorija, poput dece. Takođe, implementacija transfera RIK tehnologije koju su podržali Ministarstvo zdravlja i Svetska zdravstvena organizacija na Institutu za vakcine „Torlak“ može imati pozitivne ekonomske aspekte za zemlju.

JELENA, ŠTA MOŽEMO STVARNO DA URADIMO KAKO BISMO KAO VRSTA DOPRINELI REŠENJU PROBLEMA GLOBALNOG ZAGREVANJA?

AND YOU, MARINA, WHAT DID YOU GET YOURSELF INVOLVED IN WITH YOUR PROJECT?

Marina: As part of the REDIRECT project, the research team in Serbia started researching the process of autophagy and its potential impact on delivery, transport and immune response when applying an RNA vaccine. This research lays the foundation for some future researches and the country's competitiveness in the world of research in this domain. The research is carried out by a team of experts from the Institute of Nuclear Sciences in Vinkovci and the Institute of Virology, Vaccines and Sera "Torlak" and the Faculty of Physical Chemistry. In addition to scientific importance, this research has wider social benefits. Informing the public about the characteristics and safety of these vaccines can contribute to increasing immunization coverage, which is crucial for the protection of the most vulnerable categories, such as children. Furthermore, the implementation of RNA technology transfer supported by the Ministry of Health and the World Health Organization at the "Torlak" Vaccine Institute can have positive economic aspects for the country.

This project is supported by the Science Fund of the Republic of Serbia, Grant No. 10412, LED technology based on bismuth-sensitized Eu³⁺ luminescence for cost-effective indoor plant growth – LEDtech-GROW

Bojana: Tako je. Jedinstvenost projekta LED-TECH-GROW leži u njegovom pristupu za osvetljenje u potpuno zatvorenom prostoru koristeći isključivo prirodnu svetlost koju emituju fosforni materijali. Ova tehnologija se pokazala izuzetno efikasnom, naročito u svetlu sve češćih klimatskih promena, suša i požara koji sve više ugrožavaju obradivo zemljište.

DRUGI KLJUČNI ELEMENT PROJEKTA JE NJEKOVA POTPUNA PRIRODNOST. NE KORISTE SE VEŠTAČKA DUBRIVA ILI NEKAKLE. VEĆ SE FOKUS STAVLJA NA STVARANJE OPTIMALNIH USLOVA ZA RAST BILJAKA.

BOJANA, I BELIEVE THAT WE SOMEHOW SHARE THE SAME VIEWS ABOUT THIS ISSUE?

Bojana: That's right. The uniqueness of the LED-TECH-GROW Project lies in its approach to lighting in a completely enclosed space, using only natural light emitted by phosphorus materials. This technology has proven to be extremely effective, especially in the light of increasingly frequent climate changes, droughts and fires that are increasingly threatening arable lands.



će značajno unaprediti efikasnost i bezbednost vakcina, uz mogućnost modifikacije procesa autofagije radi bolje delotvornosti budućih vakcina. Iako se radi o bazičnom istraživanju, očekuje se da će rezultati imati veliki uticaj na kliničku praksu i unapređenje zdravlja populacije. Činjenica je da ova istraživanja predstavlja atraktivan pristup za prevenciju infektivnih bolesti, ali takođe ima i veliki potencijal za terapiju protiv tumora.

ONO ŠTO JA MOGU DA ZAKLJUČIM JESTE DA SU U NAUČI SVE VIŠE PRISUTNA ISTRAŽIVANJA U KOJIMA SE UKLJUČUJU RAZLIČITE OBLASTI. JELENA, TO JE SLUČAJ I SA OVIM NA ČEMU TI RADIŠ?

Jelena: Projekat EnviroChar je jedan veliki multidisciplinarni poduhvat koji obiluje stručnjacima iz različitih oblasti hemije što omogućava holistički pristup problemu. Uzmajući u obzir činjenicu da je ova vrsta istraživanja ključna za održivu budućnost, projekat EnviroChar predstavlja primer kako nauka može da pruži inovativna rešenja za akutne ekološke izazove.

ATI EKOLOŠKI IZAZOVI PREDSTAVLJAJU DODATNI MOTIV ZA TEBE, BOJANA, ŽE LI TAKO?

Bojana: Tako je. Pored toga što doprinose rastu

MARINA, YOUR TASK DOES NOT SEEM EASY EITHER, DOES IT?

Marina: It is very important to point out that the vaccines resulting from this research are safe. The results of the study will significantly improve the efficiency and safety of vaccines, with the possibility of modifying the autophagy process for better efficiency of future vaccines. Although this is a basic research, the results are expected to have a major impact on clinical practice and population health improvement. The fact is that this research represents an attractive approach for the prevention of infectious diseases, but it also has great potential for tumour therapy.

WHAT I CAN CONCLUDE IS THAT THERE IS MORE AND MORE RESEARCH IN SCIENCE INVOLVING DIFFERENT FIELDS. JELENA, THAT IS ALSO THE CASE WITH WHAT YOU ARE WORKING ON?

Jelena: The EnviroChar project is a large multidisciplinary undertaking that brings together experts from different chemistry disciplines, which enables a holistic approach to the problem. Considering the fact that this type of research is crucial for a sustainable future, the EnviroChar Project is an example of how science can provide innovative solutions to current environmental challenges.

ISKLJUČIVO UZ POMOĆ PRIRODNE SVETLOSTI. OVO NIJE SAMO EKOLOŠKI PRAKTIČNIJ IZ PISTU, VEĆ I EFIKASAN NAČIN DA SE OBEZBEDI DOVOLJNO HRANE ZA SVE VEĆI BROJ STANOVNIKA PLANETE.

Marina: Ako se ne varam, fosfor jeste prirodni element koji emituje svetlost. Ali kako ga možemo „zadržati“ tako da ta svetlost bude baš onakvih karakteristika koje su nam potrebne?

Bojana: Jedna od ključnih karakteristika fosfornih materijala koje se koriste u okviru ovog projekta jeste njihova sposobnost da emituju određenu boju svetlosti. Kroz analize istraživali su uticaj da su dve vrste i plava boja najkorisnije biljkama jer ih apsorbuju klorofil i drugi biljni fotoreceptori. To znači da biljke mogu efikasno da apsorbuju svetlost i da brže rastu, što rezultira većom prinomom.

MARINA, NI PRED TOBOM NIJE LAK ZADATAK, ZAR NE?

Marina: Veoma je važno istaći da su vakcine koje proizilaze iz ovog istraživanja bezbedne. Rezultati stuje

ANOTHER KEY ELEMENT OF THE PROJECT IS THE FACT IT IS COMPLETELY NATURAL. NO ARTIFICIAL FERTILIZERS OR CHEMICALS ARE USED, BUT THE FOCUS IS ON CREATING OPTIMAL CONDITIONS FOR PLANT GROWTH USING ONLY NATURAL LIGHT. THIS IS NOT ONLY AN ENVIRONMENTALLY FRIENDLY APPROACH, BUT ALSO AN EFFECTIVE WAY TO PROVIDE ENOUGH FOOD FOR THE EVER-INCREASING POPULATION IN OUR PLANET.

Marina: If I'm not mistaken, phosphorus is a natural element that emits light. But how can we "train" it so that light has exactly the properties we need?

Bojana: One of the key characteristics of the phosphorus materials used in this project is their ability to emit a certain colour of light. By conducting analyses, the researchers determined that red and blue are the most useful colours for plants, because they are absorbed by chlorophyll and other plant photoreceptors. This means plants can absorb light more efficiently and grow faster, resulting in higher yields.



biljaka, neorganski fosfori su veoma stabilni u spoljašnjim uslovima sa visokom vlažnošću, što ih čini idealnim za upotrebu u poljoprivredi. Ova tehnologija predstavlja pravi paradigmatni pomak u osvetljenju biljaka pružajući efikasno rešenje za buduće izazove u proizvodnji hrane. Promis projekt nije samo naučni poduhvat, već i praktično rešenje za sve veće izazove koje donosi rast svetke populacije. Uvođenjem ove tehnologije, možemo se nadati da ćemo osigurati dovoljno hrane za sve i očuvati našu planetu za buduće generacije.

ALI, PITANJE KOJE ČESTO MENI POSTAVLJAJU, A VERUJEM I VAMA ODMA, JESTE KOLIKO SMO I MI OVDE UOPŠTE RELEVANTNI NA NEKOM GLOBALNOM NIVOU?

Marina: Odgovorili u svoje ime, ali verujem da se odnosi i na to čime se vas dve bavite. Moj projekat pod imenom REDIRECT predstavlja samo početak, već sada možemo zaključiti da Srbija ima savetu naučnu budućnost i da će zahvaljujući ovakvim projektima, biti konkurentna u globalnoj areni istraživanja.



AND THOSE ENVIRONMENTAL CHALLENGES REPRESENT AN ADDITIONAL MOTIVE FOR YOU, BOJANA, DON'T THEY?

Bojana: That's right. In addition to promoting plant growth, inorganic phosphorus is very stable in high humidity outdoor conditions, making it ideal for agricultural use. This technology represents a real paradigm shift in plant lighting, providing an efficient solution to future challenges in food production. The Promis Project is not only a scientific endeavour, but also a practical solution to the increasing challenges triggered by the growth of the world's population. By introducing this technology, we can hope to ensure enough food for everyone and preserve our planet for future generations.

BUT THE QUESTION THAT I AM OFTEN ASKED, AND I BELIEVE YOU TWO AS WELL, IS HOW RELEVANT ARE WE HERE ON A GLOBAL LEVEL?

Marina: I will answer on my own behalf, but I believe it also refers to what you two do. My project called REDIRECT is only the beginning, and we can already conclude now that Serbia has a bright scientific future and that, thanks to such projects, it will be competitive in the global research arena.

PROJEKT LEDTECH-GROW: SVETLOSNJA TRANSFORMACIJA POLJOPRIVREDE

Dr Bojana Mikićević radi u Centru izuzetnih vrednosti za konverziju svetlosne energije – CONVERSE, u Institutu za nuklearne nauke Vinča. Njen obrazovni put obuhvata doktorat iz fizike hemije na Univerzitetu u Beogradu, kao i postdoktorske studije na Univerzitetu u Kini. Tokom studija u Kini, Bojana se posvetila istraživanju led dioda fosfora, što je postalo osnovu za projekat LEDTECH-GROW u okviru programa PROMIS 2023, Fonda za nauku.

PROJEKT REDIRECT: AUTOFAGIJA KAO KLJUČ ZA RNK VAKCINE

Dr Marina Stamenković dolazi sa Medicinskog fakulteta, Univerziteta u Beogradu gde je docent na Katedri za imunologiju i radi na Institutu za mikrobiologiju i imunologiju. Marina, zajedno sa svojim timom, sproveli projekat REDIRECT u okviru programa PROMIS 2023, Fonda za nauku.

PROJEKT ENVIROCHAR: BIOUGALJ KAO ODRŽIVO REŠENJE

Na Prirodno-matematičkom fakultetu Univerziteta u Novom Sadu, tim stručnjaka predvođen varednim profesorom dr Željekom Bejić radi na projektu pod nazivom „EnviroChar“, koji se fokusira na proizvodnju biougalja. Projekat će razviti odgovarajući biouglje u skladu sa zelenim principima i zelenom hemijom i primeniti ga u ekološkoj, analitičkoj i elektroanalitičkoj hemiji kao materijal za razvoj metoda za određivanje i uklanjanje postojanih organskih zagadivača iz vodene sredine.

LEDTECH-GROW PROJECT: LIGHT TRANSFORMATION OF AGRICULTURE

Dr Bojana Mikićević works at the Centre of Exceptional Values for the Conversion of Light Energy – CONVERSE, at the Institute of Nuclear Sciences in Vinča. Her educational path includes a PhD in physical chemistry at a university in China. During her studies in China, Bojana devoted herself to the research of LEDs and phosphorus, which laid the foundation for the LEDTECH-GROW Project within the PROMIS 2023 program of the Science Fund.

REDIRECT PROJECT: AUTOPHAGY AS THE KEY TO RNA VACCINES

Dr Marina Stamenković comes from the Faculty of Medicine, University of Belgrade, where she is an assistant professor at the Department of Immunology and works at the Institute of Microbiology and Immunology. Marina, together with her team, implements the REDIRECT project within the PROMIS 2023 Programme of the Science Fund.

THE ENVIROCHAR PROJECT: BIOCHAR AS A SUSTAINABLE SOLUTION

At the Faculty of Science and Mathematics of the University of Novi Sad, a team of experts led by associate professor, Dr. Jelena Bejić, is working on a project called „EnviroChar“, which focuses on the production of biochar. The project will develop a suitable biochar in accordance with green principles and green chemistry and apply it in ecological, analytical and electroanalytical chemistry as a material for the development of methods determining and removing persistent organic pollutants from the aquatic environment.

This project is supported by the Science Fund of the Republic of Serbia, Grant No. 10412, LED technology based on bismuth-sensitized Eu³⁺ luminescence for cost-effective indoor plant growth – LEDtech-GROW

Annex IV

Poster presentation for youth population at the 15th European Researchers' Night, September 2024.



Annex V

List of scientific publications – to be updated regularly in the DCE Plan and LEDtech-GROW Website

No.	AUTHORS	ARTICLE TITLE	JOURNAL	STATUS
1.	Bojana Milićević, Aleksandar Ćirić, Zoran Ristić, Mina Medić, Abdullah N. Alodhayb, Ivana Radosavljević Evans, Željka Antić, Miroslav D. Dramićanin	Eu³⁺- activated Sr₂GdF₇ colloid and nano-powder for biomarker and horticulture LED	Journal of Alloys and Compounds (M21a)	Submitted
2.	Katarina Milenković, Ljubica Đaćanin Far, Sanja Kuzman, Željka Antić, Aleksandar Ćirić, Miroslav D. Dramićanin, Bojana Milićević	Red emission enhancement in BaYF₅:Eu³⁺ phosphor nanoparticles by Bi³⁺ co-doping	Optics Express (M21)	Submitted
3.	Jovana Periša, Sanja Kuzman, Aleksandar Ćirić, Zoran Ristić, Željka Antić, Miroslav Dramićanin, Bojana Milićević	Tuneable red and blue emission of Bi³⁺-codoped SrF₂:Eu³⁺ nanophosphors for agricultural LEDs	Nanomaterials (M21)	Submitted

Annex VI

List of Poster presentations at scientific congresses – to be updated regularly in the DCE Plan and LEDtech-GROW Website

No.	AUTHORS	PRESENTATION TITLE	CONGRESS	DATE	PLACE
1.	Katarina Milenković , Vesna Đorđević, Sanja Kuzman, Jovana Periša, Bojana Milićević, Miroslav D. Dramićanin	Three-fold enhancement of Eu³⁺ emission intensity in BaYF₅ nanoparticles by Bi³⁺ co-doping	12 th International Conference on Luminescent Detectors and Transformers of Ionizing Radiation (https://www.cfi.lu.lv/en/lumdetr2024/)	June 16-21, 2024	Riga, Latvia
2.	Bojana Milićević , Aleksandar Ćirić, Zoran Ristić, Mina Medić, Ivana Radosavljevic Evans, Željka Antić, Miroslav D. Dramićanin	Synthesis, luminescent properties, and thermal stability of Eu³⁺-doped Sr₂GdF₇ red-emitting nanophosphor for horticulture LEDs	The 7 th International Conference on the Physics of Optical Materials and Devices & The 4 th International Conference on Phosphor Thermometry (https://icomonline.org/)	August 26-30, 2024	Bečići, Budva, Montenegro
3.	Sanja Kuzman , Bojana Milićević, Jovana Periša, Aleksandar Ćirić, Zoran Ristić, Željka Antić, Miroslav	Synthesis and photoluminescent properties of Bi³⁺-codoped SrF₂:Eu³⁺ phosphor nanoparticles	The 7 th International Conference on the Physics of Optical Materials and Devices & The 4 th International Conference on Phosphor Thermometry (https://icomonline.org/)	August 26-30, 2024	Bečići, Budva, Montenegro
4.	Katarina Milenković , Vesna Đorđević, Ivana Zeković, Zoran Ristić, Jovana Periša, Bojana Milićević, Miroslav D. Dramićanin	Microwave-assisted solvothermal method for RbY₃F₁₀ doped with Eu³⁺	The 7 th International Conference on the Physics of Optical Materials and Devices & The 4 th International Conference on Phosphor Thermometry (https://icomonline.org/)	August 26-30, 2024	Bečići, Budva, Montenegro

List of Invited and Oral presentations at scientific congresses – to be updated regularly in the DCE Plan and LEDtech-GROW Website

No.	AUTHORS	PRESENTATION TITLE	CONGRESS	DATE	PLACE
1.	Sanja Kuzman, Bojana Milićević, Katarina Milenković, Jovana Periša, Miroslav D. Dramićanin (Invited talk)	Bismuth-Sensitized Eu³⁺ Luminescent LED Technology for Effective Indoor Plant Growth	The 3 rd Serbian Conference on Materials Application and Technology – SCOM2024 (https://www.razvojnauke.org/)	October 16-18, 2024	Belgrade, Serbia

List of general public events

No.	ATTENDEE	PRESENTATION	EVENTS	DATE	PLACE
1.	Bojana Milićević Jovana Periša	Principal investigators of 30 projects supported under the PROMIS 2023 program were presented at the ceremony	The Science Fund celebrated 5 years since its establishment (https://fondzanauku.gov.rs/2024/03/fond-zanauku-svecano-obelezio-5-godina-od-osnivanja/)	March 20, 2024	Belgrade, Serbia
2.	Jovana Periša	Leaflet and promotional material	The 66 th International Fair of Techniques and Technical Achievements	March 21-24, 2024	Belgrade, Serbia
3.	Bojana Milićević, Sanja Kuzman	Revolutionizing LED technology for plant growth	15 th European Researchers' Night, (https://nocistrazivaca.rs/radionice_i_programi/ledtech-grow/)	September 27, 2024	Belgrade, Serbia

This project is supported by the Science Fund of the Republic of Serbia, Grant No. 10412, LED technology based on bismuth-sensitized Eu³⁺ luminescence for cost-effective indoor plant growth – LEDtech-GROW

List of training events

No.	TRAINING ATTENDEE	TRAINING TITLE	TRAINING ORGANIZED	DATE	PLACE
1.	All team members	How to make the best use unfunded project proposals?	Marija Šola Spasić, coordinator of Management Office projects at Vinca Institute for Nuclear Sciences, National Institute of the Republic of Serbia, University of Belgrade	February 6, 2024	Online
2.	Ljubica Đačanin Far, Bojana Milićević	Training for preparing, writing, and managing Horizon projects	The European Training Academy (EUTA)	February 22, February 23, February 27, March 1, 2024	Belgrade, Serbia
3.	All team members	Protection of Trade Secrets	The Intellectual Property Office of the Republic of Serbia (Lecturer: Aleksandra Mihailović, Asst. Director)	March 5, 2024	Online
4.	All team members	Introduction to Patents	The Intellectual Property Office of the Republic of Serbia (Lecturer: Nataša Milovanović, Head of the Department for Mechanical Engineering, Electrotechnics and General Technology)	March 12, 2024	Online
5.	All team members	International Protection of Inventions	The Intellectual Property Office of the Republic of Serbia (Lecturer: Aleksandra Mihailović, Asst. Director)	March 19, 2024	Online
6.	All team members	Software protection with a patent	The Intellectual Property Office of the Republic of Serbia (Lecturer: Nataša Milovanović, Head of the Department for Mechanical Engineering, Electrotechnics and General Technology)	March 26, 2024	Online
7.	All team members	Compiling an application for the protection of an invention	The Intellectual Property Office of the Republic of Serbia (Lecturer: Jelena Tomić Keser, Head of the Department for Chemistry and Chemical Technology)	April 2, 2024	Online
8.	Bojana Milićević, Sanja Kuzman,	Excel Masterclass	Aleksandar Grašić	Will be held on October	Online

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Jovana Periša

3, 2024
