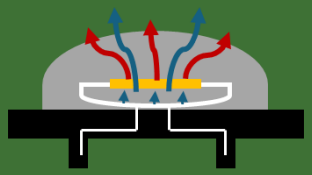
PROJECT FLOW

Design, synthesis and characterisation of plant-grow-targeted phosphors

Design, fabrication and LEDs performance



Professional development of young and early stage researchers

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LEDtech GROW

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

OMAS Group

Science Fund of the Republic of Serbia

VINČA INSTITUTE OF NUCLEAR SCIENCES University of Belgrade NATIONAL INSTITUTE OF THE REPUBLIC OF SERBIA

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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.

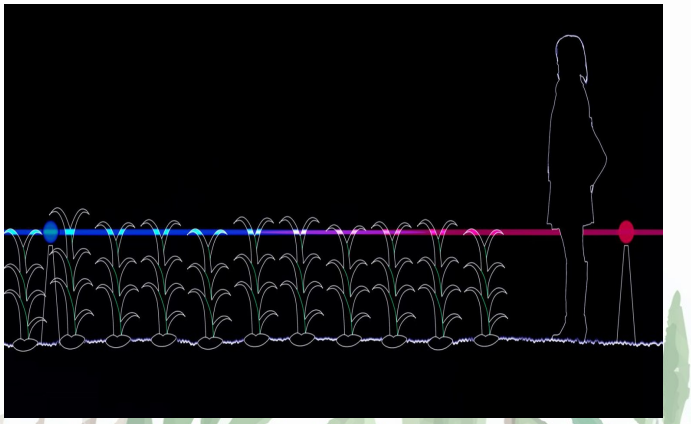
We will develop inorganic phosphors that convert as much electrical energy as possible into a Photosynthetically Active Radiation (PAR) spectrum of plant photoreceptors.

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 $Bi^{3+} \rightarrow Eu^{3+}$ 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.

Истраживање је спроведено уз подршку Фонда за науку Републике Србије, 10412, LED TECHNOLOGY BASED ON BISMUTH-SENSITIZED Eu^{3+} LUMINESCENCE FOR COST-EFFECTIVE INDOOR PLANT GROWTH– LEDTech-Grow/
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