PROJECT ACRONYM AND TITLE: **Fe3+, Bi3+ co-doped phosphors for novel efficient Near-Infrared LEDs**

FUNDING PROGRAMME: **MAECI Italia-Polonia**

CALL: **CALL FOR JOINT PROJECT PROPOSALS PROGRAMME CANALETTO BILATERAL EXCHANGE OF SCIENTISTS**

SCIENTIFIC FIELDS: ***LEDs, NIR, phosphors***

HOST DEPARTMENT: **Department of Molecular Sciences and Nanosystems**

SCIENTIFIC RESPONSIBLE: **Pietro Riello, MicheleBack**

FINANCIAL DATA:

Project total costs	Overall funding assigned to UNIVE

ABSTRACT:
Thermally stable and efficient NIR phosphors to be implemented in NIR pc-LEDs for applications in the agricultural industry or to control the food quality, to name a few, are highly challenging. The recent NIR phosphors based on Cr3+ suffer from the enhancing of the thermal quenching of the luminescence when the emission is red-shifted by playing on the crystal field strength of the octahedral CrO6. In this view, transition metal ions stabilized in tetrahedral sites are expected to overcome this limitation. With the aim of providing a new family of efficient NIR phosphors thermally stable, we propose the use of a combination of Fe3+ in tetrahedral sites and the sensitization with Bi3+ to enhance the cross-section and the luminescence efficiency through energy transfer. Based on promising preliminary results, we will investigate two families of compounds: AM4O7:Bi,Fe and AM2O4:Bi,Fe (with A=Mg, Ca, Sr, Ba and M=Al, Ga), optimizing the doping content and the annealing temperature. The investigation of the thermal quenching of the luminescence of the materials will be deeply analyzed to set guidelines for the future design of Fe3+-doped phosphors. A combination of theoretical, structural/morphological, and detailed spectroscopic analyses will be exploited to optimize the systems and, finally, to build NIR pc-LEDs with the best performing NIR emitting phosphors. The results are expected to significantly contribute to the development of a new group of phosphors for NIR applications, with a significant reduction of the energy consumption associated with the generation of NIR radiation and the reduction of the cost of their use. The combination of the structural/morphological knowledge of the Italian team along with the spectroscopic knowledge of the Polish team is expected to be beneficial not only for the project but also for the sharing between the two Parties and the improvement of the early career researchers involved.

Planned Start date	Planned End date
01/01/2022	31/12/2023

PARTNERSHIP:

1 Università Ca' Foscari Venezia	**Italy**	**Coordinator**
2 Polish Academy of Sciences	**Poland**	**Partner**