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H2020 European FET-Open project DROP-IT

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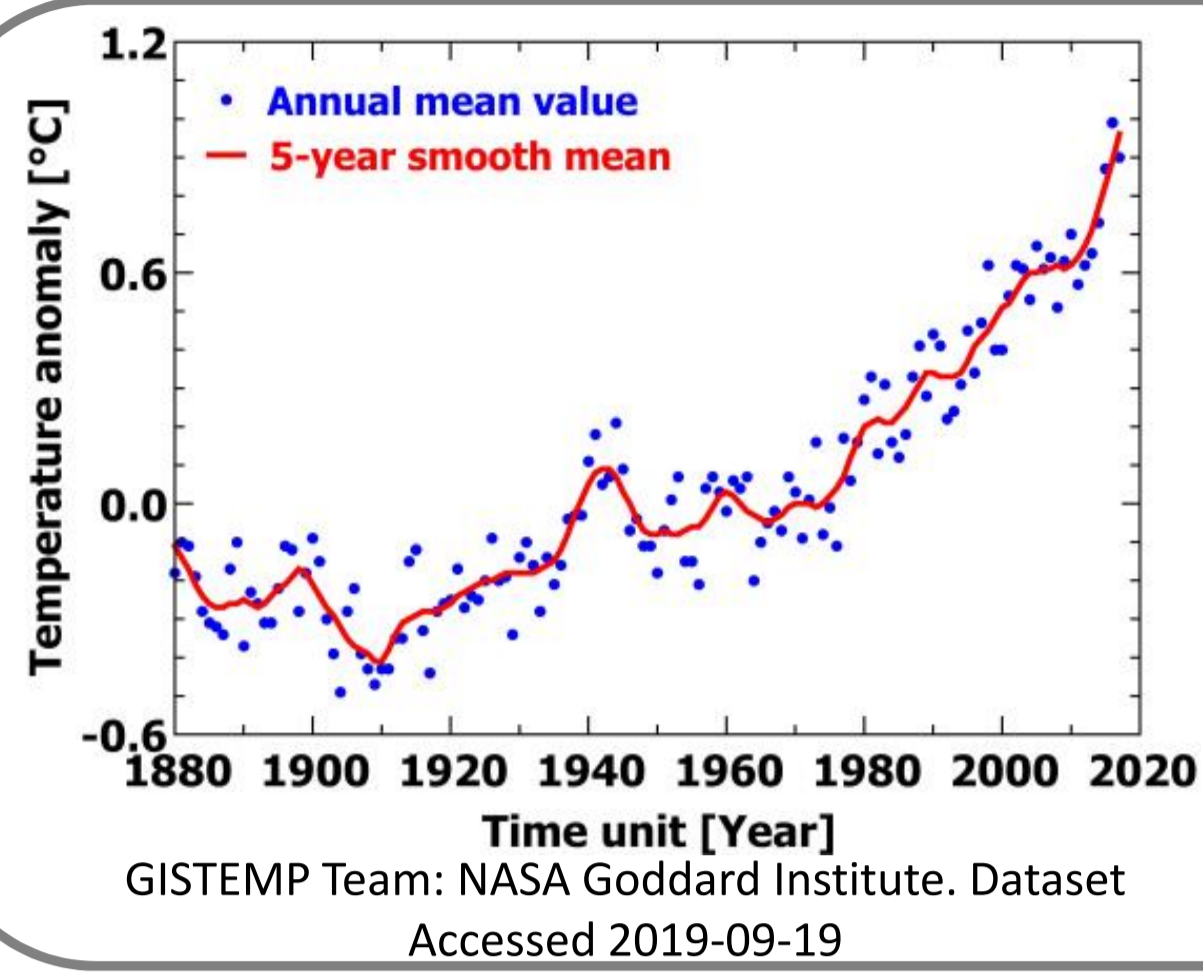
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Introduction

The climate change and its impacts are nowadays well established and cannot be ignored¹. The international community agrees to have a fast energy transition, which translates in developing more efficient photovoltaic cells, light emitting and photocatalytic devices. Since 2009, hybrid metal halide organic perovskites came in the limelight because of the impressive photovoltaic performances, which have currently overcome the 25%², and because of their great potential for other optoelectronic applications such as Laser, Light Emitting Devices (LED), Photodetection, Photocatalysis.

(1) Obama, B. The Irreversible Momentum of Clean Energy. *Science* 2017, 355 (6321), 126.
(2) <https://www.nrel.gov/pv/cell-efficiency.html>

DROP-IT: Abstract

Roll-to-Roll
lead-free
perovskites
flexible
optoelectronics
LEDs
inkjet printing
Materials engineering

Interfaces
nanocrystals
thin films
printing
nanostructures

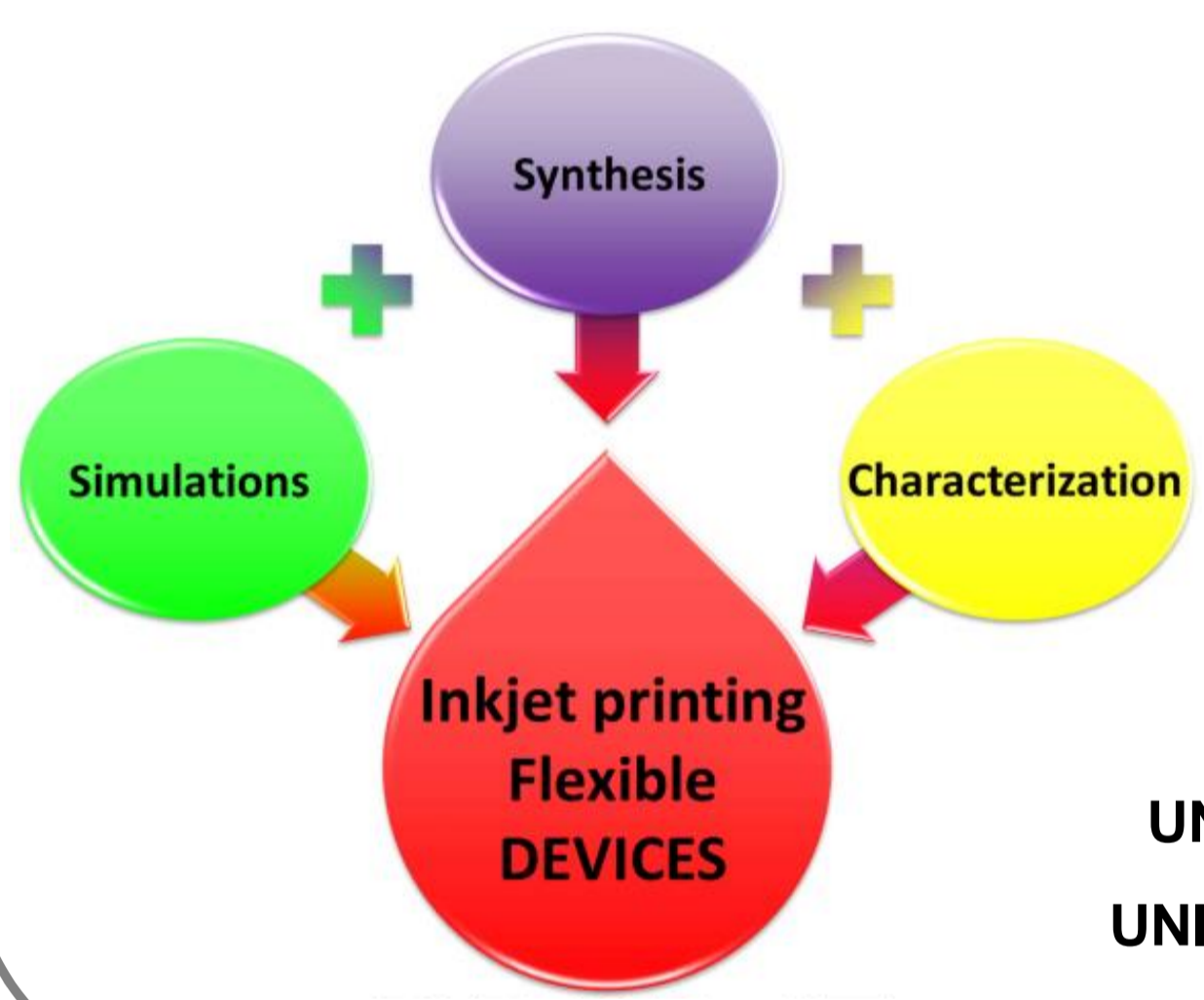
electronic structure
photonics
synthesis

DROP-IT proposes the development of novel lead-free and stable perovskites (LFPs). Specifically, crystalline structures beyond conventional ABX_3 compounds, double-perovskites and ruddoffites, will be computationally screened and chemically synthesized with superior properties. DROP-IT will develop highly pioneering lead free perovskites (in bulk and nanoscale) by low-cost, high throughput, sustainable, large-scale fabrication techniques on flexible substrates to revolutionize future power, lighting and communication systems. DROP-IT technology will be based on: (1) Theoretical screening of different LFP compound families and chemical synthesis of most suitable ones in the form of nanocrystals and polycrystalline thin films, (2) Formulation of specific and suitable inks of these materials for (3) Inkjet printing of thin films on flexible substrates and (4) Development of stable optoelectronic and photonic devices as proofs-of-concept.

DROP-IT: Consortium

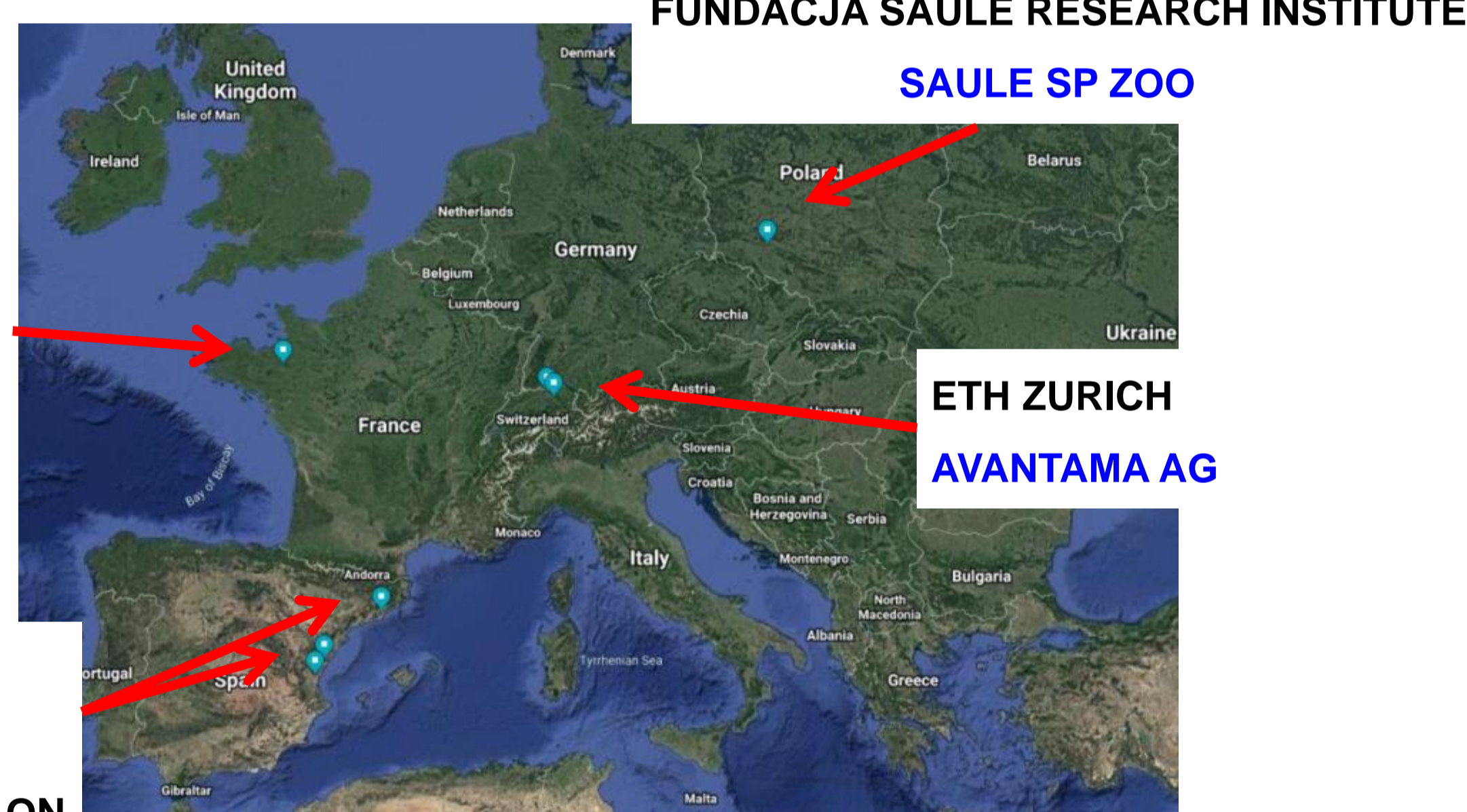
COORDINATOR: UNIVERSITAT DE VALENCIA

8 Partners (4countries, 2 companies):



UNIVERSITAT DE VALENCIA
UNIVERSITAT DE BARCELONA
UNIVERSITAT JAUME I DE CASTELLON

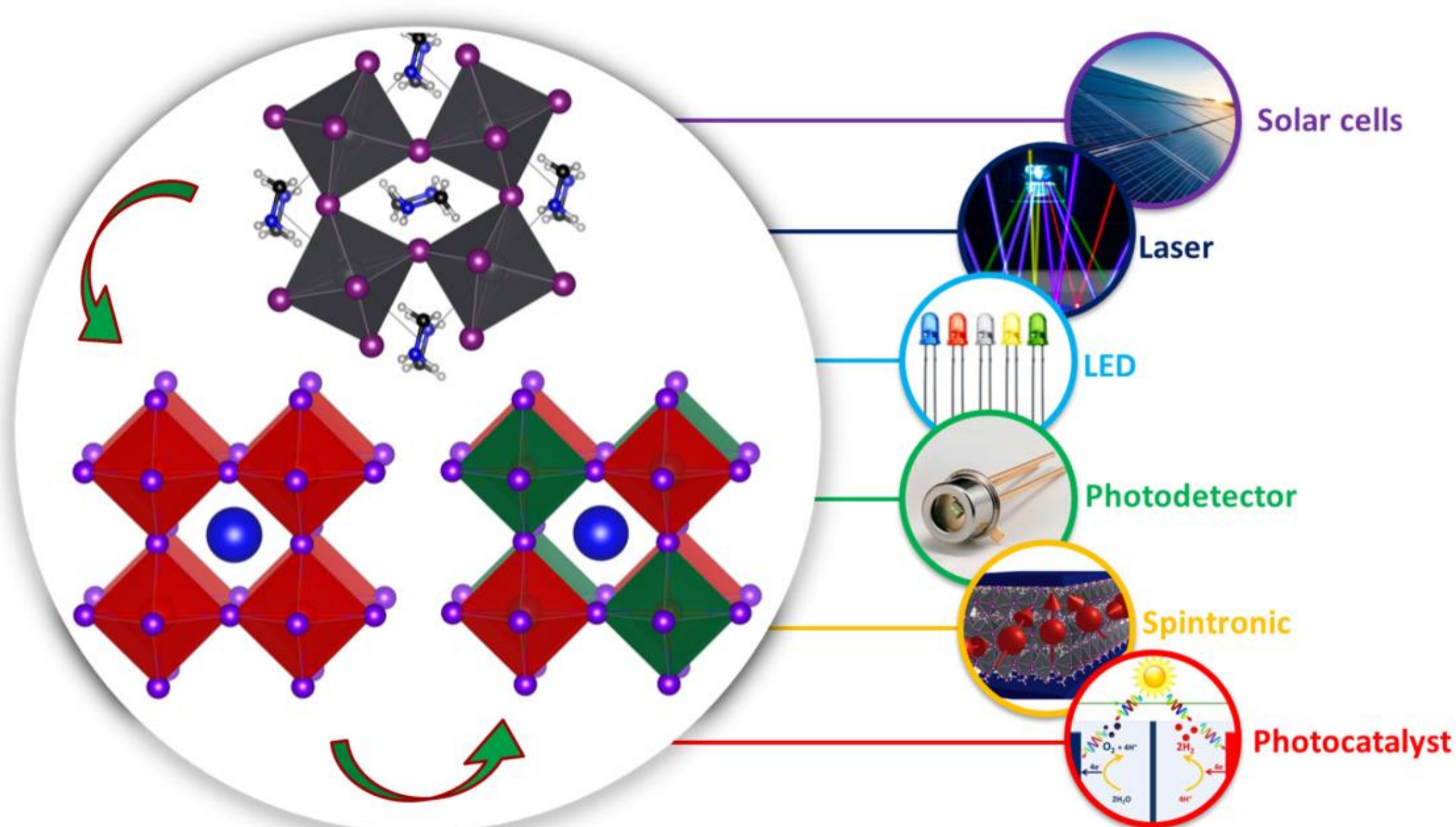
INSA Rennes
& ISCR



KICK-OFF MEETING OF DROP-IT IN VALENCIA
17th October 2019

Total Budget : 3,461 Millions €
Budget for INSA Rennes : 387 875€ (11.2% of Total Budget)
Duration : 36 months from 01/11/2019

DROP-IT: Material screening

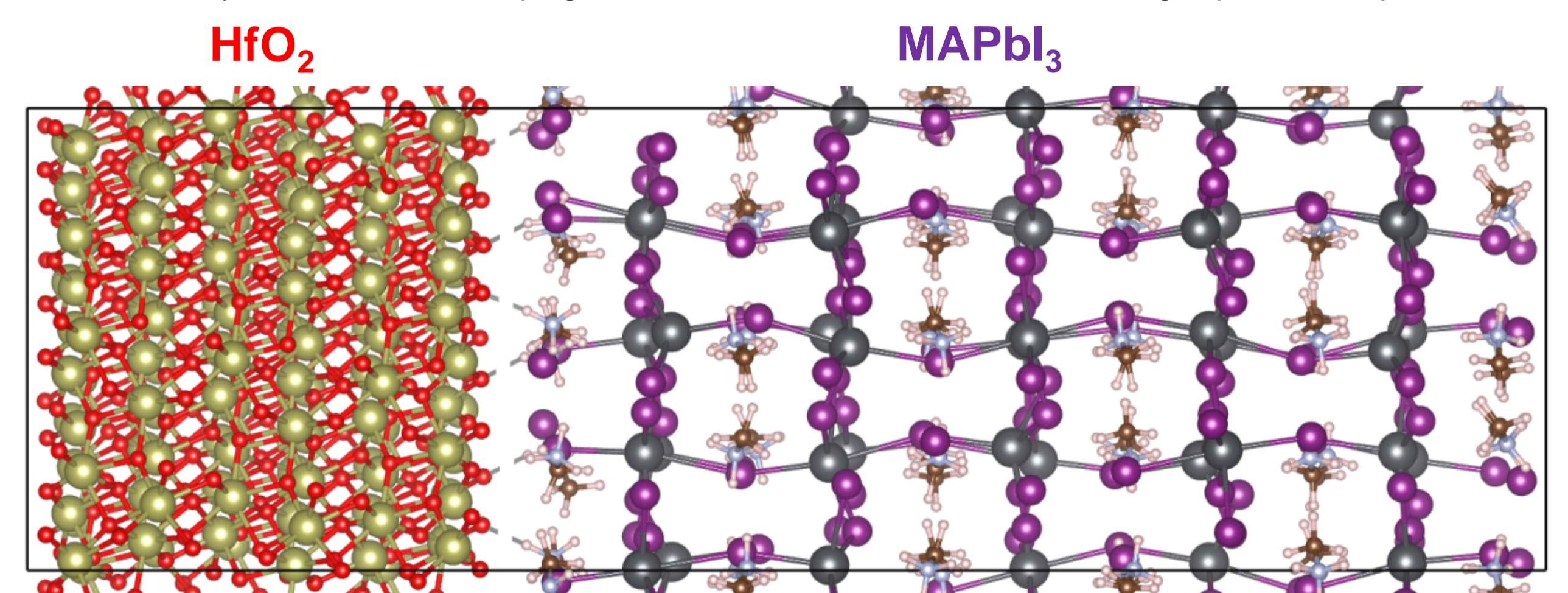


Screening lead-free perovskite materials for various applications

Source: HDR-Pedesseau 2019

"Heterostructures are heterogeneous semiconductor structures built from two or more different semiconductors, in such a way that the transition region or interface between the different materials plays an essential role in any device action. Often, it may be said that the interface is the device."

Herbert Kroemer. Heterostructures for Everything? 51st Lindau Nobel Laureate Meeting, 2001
Nobel Prize in Physics 2000 "for developing semiconductor heterostructures used in high-speed- and optoelectronics."



Studying the interfaces between the chosen perovskite materials and external layers.

N. Canicoba, et al. *ACS Materials Lett.* 2019, 1, 633 10.1021/acsmaterialslett.9b00357

Acknowledgements

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