

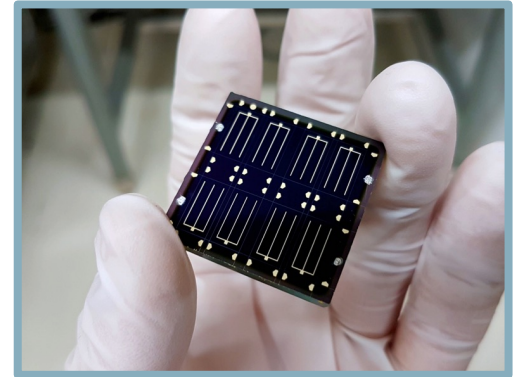


UNIVERSITAT POLITÈCNICA  
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# Circular Materials in Thin Film Photovoltaic Technologies

Edgardo Saucedo  
MNT-PV, EEL, EEBE & ETSEIB

09-02-2023

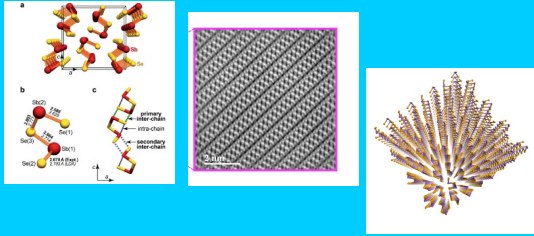




- Joaquim Puigdollers (Professor)
- Cristobal Voz (Professor)
- Pablo Ortega (Professor)
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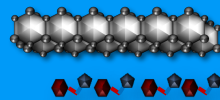
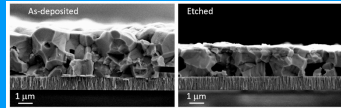
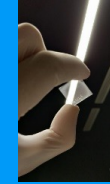
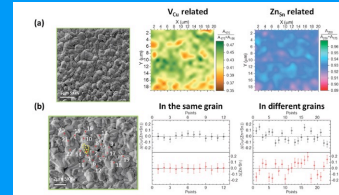
## LOW DIMENSIONAL MATERIALS FOR PHOTONIC APPLICATIONS



SEMI-SATE



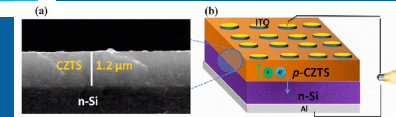
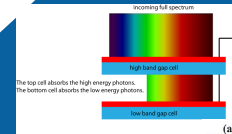
## PHOTOVOLTAIC TECHNOLOGIES WITH EARTH ABUNDANT ELEMENTS



SEMI-SATE



## HIGHLY SELECTIVE ELECTRIC CONTACTS



## INNOVATIVE PHOTOVOLTAIC DEVICES FOR ULTRA-HIGH EFFICIENCY



# Índex

Research lines in circular metals and critical raw materials in PV at MNT-PV

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Interaction with Companies in the Field

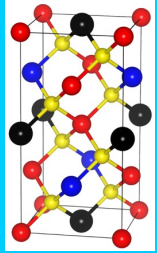
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Projects in the Field

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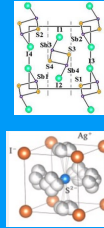
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### Critical raw materials free thin film PV technologies



- Thin film PV technologies based on earth-abundant materials: kesterite (Cu, Zn, Sn, S)
- Eco-friendly selective contacts free of toxic and critical elements

### Emerging materials with ultra-high light absorption



- Mixed (Sb,Bi) chalco-halides with van der Waals structure
- Anti-perovskite chalco-halide compounds for extremely thin absorber devices

### Contribution to circular economy in thin film PV



- Eco-friendly thin film deposition techniques: spin coating, spray, co-evaporation, sputtering
- Energy intensive methodologies and materials with low temperature processing (<500°C)



### Contribution to recycling activities in PV



- Recycling of high added value metals (Sn, In, Ag, Mo, Sb, Bi)
- Separation of toxic or contaminant elements (Cd, Se)

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Life cycle assessment of different chalcogenide thin-film solar cells

Shahaboddin Resalati<sup>a,\*</sup>, Tobechi Okoroafor<sup>a</sup>, Amani Maalouf<sup>a</sup>, Edgardo Saucedo<sup>b</sup>, Marcel Placidi<sup>b,c</sup>

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## RESEARCH ARTICLE

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## Towards Low Cost and Sustainable Thin Film Thermoelectric Devices Based on Quaternary Chalcogenides

Eleonora Isotta, Jacob Andrade-Arvizu, Ubaidah Syafiq, Alex Jiménez-Arguijo, Alejandro Navarro-Güell, Maxim Guc, Edgardo Saucedo, and Paolo Scardi\*

ACS APPLIED  
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Article

## Expanding the Perspective of Polymeric Selective Contacts in Photovoltaic Devices Using Branched Polyethyleneimine

Eloi Ros,<sup>a,\*</sup> Thomas Tom,<sup>§</sup> David Rovira, Julià Lopez, Gerard Masmitjà, Benjamin Pusay, Estefania Almache, Isidro Martin, Maykel Jimenez, Edgardo Saucedo, Eva Tormos, Jose Miguel Asensi, Pablo Ortega, Joan Bertomeu, Joaquim Puigdollers, and Cristobal Voz



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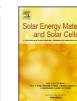
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Solar Energy Materials and Solar Cells

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Challenges and improvement pathways to develop quasi-1D (Sb<sub>1-x</sub>Bi<sub>x</sub>)<sub>2</sub>Se<sub>3</sub>-based materials for optically tuneable photovoltaic applications. Towards chalcogenide narrow-bandgap devices

Ivan Caño<sup>a,\*</sup>, Pedro Vidal-Fuentes<sup>b</sup>, Axel Gon Medaille<sup>b</sup>, Zacharie Jehl<sup>a</sup>, Alex Jiménez-Arguijo<sup>b</sup>, Maxim Guc<sup>b</sup>, Victor Izquierdo-Roca<sup>b</sup>, Claudia Malerba<sup>c</sup>, Matteo Valentini<sup>c</sup>, Maykel Jiménez-Guerra<sup>a</sup>, Marcel Placidi<sup>a</sup>, Joaquim Puigdollers<sup>a</sup>, Edgardo Saucedo<sup>a</sup>

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