Lifetime improvement of carbon based Perovskite solar cells

Duration: 12 months possible renewable *Start*: from July 2020 if possible

Contract: Temporary position

Place: CEA/LITEN/DTS/Laboratoire des Modules PhotoVoltaïques Organiques (LMPO)

INES (Institut National de l'Energie Solaire) - Savoie Technolac BP332 - 50 avenue du Lac Léman 73377 Le Bourget du lac - France

Context:

The printed PV laboratory in CEA / LITEN works for almost 5 years about the development of photovoltaic technologies based on Perovskites materials. Perovskite materials are cheap to produce and simple to manufacture. Solar cell efficiencies of devices using these materials have increased from 3.8% in 2009 to 24.8% in 2020, making this the fastest-advancing solar technology to date. Among the different Perovskite PV technologies, the printable carbon-based approach is the ones of the most promising in terms of ease of manufacturing, long-term stability, environmental impact, and carbon footprint.

Nevertheless, these record data are obtained using small active surface area and a lot of issues regarding stability are still challenging. These 2 axes are critical for the emergence of this technology on the market.

Objectives:

The LMPO lab is involved in the Unique project (European network of national and regional funding organizations) with a top class consortium including industrial leader in the field of Perovskites (https://www.solaronix.com/news/the-european-consortium-on-carbon-based-perovskite-solar-cells-is-born-solaronix-as-industrial-partner/).

In this project, the LMPO is mostly focused on the stability issue of the perovskites devices. The main line of action will consist in the encapsulation of the photovoltaic devices in order to prevent atmosphere ingress and improve lifetime. The encapsulation will be performed by lamination of glass cover with different sealing materials or by direct coating of the gas barrier protection (thin film encapsulation). Benchmark and in-house materials and processes will be used.

The lifetime studies will be performed in climatic chambers with accelerated temperature/humidity/illumination conditions and in outdoor conditions. The performances will be characterized by electrical measurements and further analyzed with advanced characterization methods like photoluminescence, electroluminescence and lab-made optical test.

Profile:

- PhD in the field of physical-chemistry of materials. A further experience in polymer materials, organic or perovksite semi-conductors would be appreciated.
- High affinity for lab work
- Strong problem-solving skills
- Quality of written reports (English)
- Communication in French or English with people from various backgrounds

Contacts:

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