

NEXT-FOIL

Next generation conductive solar foil for flexible photovoltaics

Project duration: from 03.2018 to 12.2020

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Publishable Summary

Photovoltaics (PV), based on organic, inorganic or perovskite absorbers, can be fabricated as lightweight and flexible modules, making them attractive for integration in building façades and consumer products. These PV technologies rely on substrates coated with a transparent electrode of high transparency and low sheet resistance. ITO (indium-tin-oxide) is by far the most common electrode, despite its high cost, poor mechanical stability and low figure-of-merit when applied on flexible substrates like PET.

NEXT-FOIL developed an alternative to ITO-coated PET, based on dielectric/metal/dielectric (DMD) multilayers, sputtered at rates compatible to high-throughput, industrial production. As dielectrics, compounds based on MoO_x and TiO_x , were used, with electronic properties that allow their use either as anodes or as cathodes in different solar cell architectures. Optimized DMD electrodes offer: (i) better performance/cost figure than ITO, (ii) sheet resistance $<10 \text{ } \Omega/\text{sq}$, without substrate heating during deposition, (iii) unsurpassed stability of the resistance against bending and (iv) adaptability to specific device energetics.

The industrial applicability of the DMD electrodes was demonstrated by their deposition in a fast, roll-to-roll process and by their implementation for the fabrication of perovskite solar cells, with performance similar to that achieved for ITO-coated substrates.

The consortium consisted of the AIT Austrian Institute of Technology, tackling the simulation and experimental realization of the DMDs, Plansee (Austria) that developed the new oxide compound sputter targets and Solaronix (Switzerland) that implemented the developed electrodes in efficient perovskite cells, together with AIT.

The proof-of-concept of continuous manufacturing and the functional validation of the DMD coated polymer substrates opens the doors for industrial applications of flexible PV devices, printed electronics, or flexible OLED displays.

Project consortium

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Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
Austria	2	599'776	431'772
Switzerland	1	280'209	112'082
<i>Total</i>	3	879'985	543'854

Funding agencies involved and contracts

Funding Agency	Contract N° and Title
FFG	863517
BFE	SI/501684-01

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