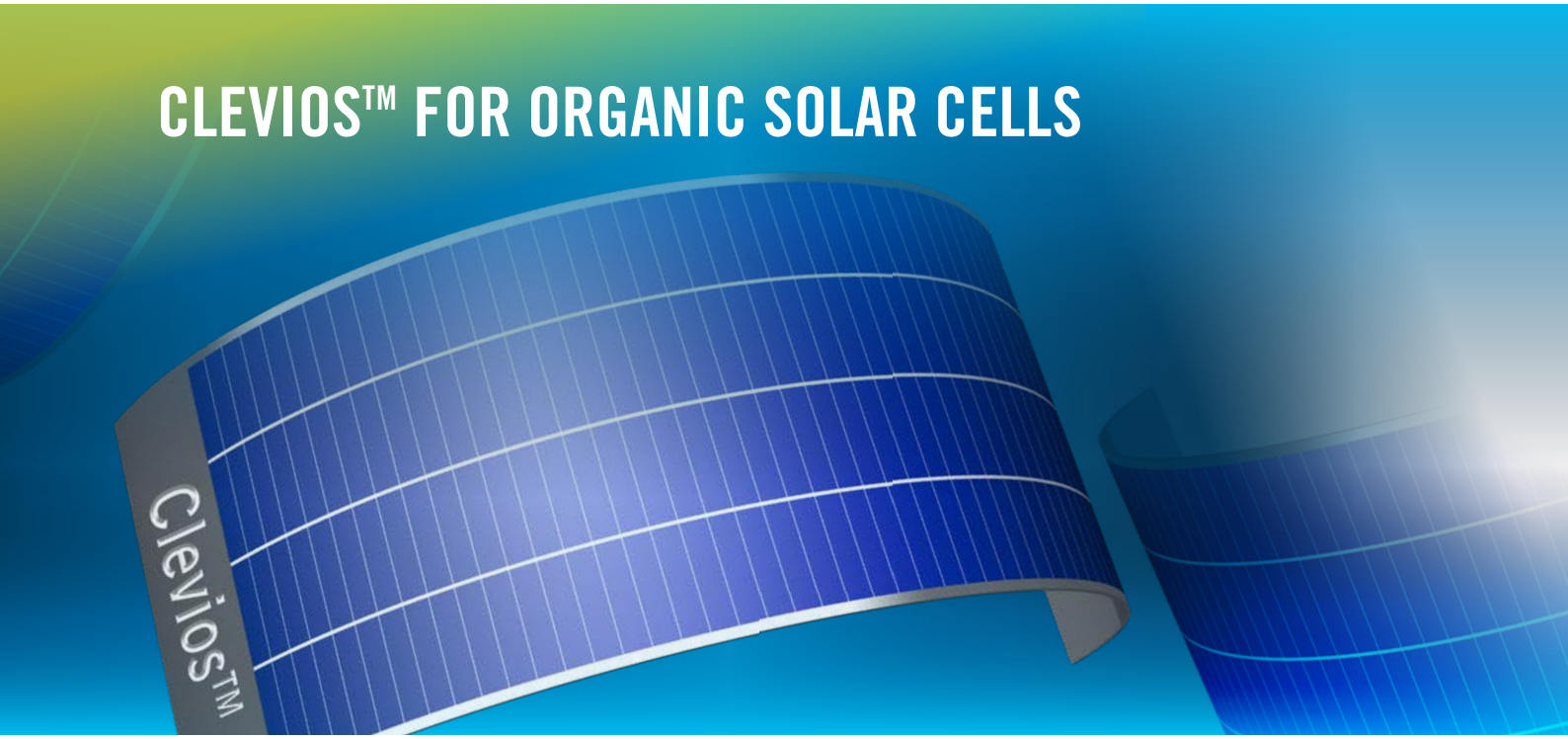
Heraeus

CLEVIOS™ FOR ORGANIC SOLAR CELLS



Innovative Materials and Processing Technologies for Organic Solar Cells

Heraeus offers Clevios™ conductive polymers, SOL silver pastes, and photonic curing and sintering process technologies for organic solar cell (OPV) applications:

All materials provide flexibility combined with low cost processing from solution by coating or printing. Organic solar cells – in contrast to their inorganic silicon counterparts – are lightweight and portable, highly flexible, colorful and aesthetic. They can be recycled, have a low carbon footprint, and can be made transparent. Manifold new products and applications are being developed at the moment, for example building integrated photovoltaics (BIPV), portable or wearable chargers, indoor light harvesting, automotive, consumer electronics etc.

Heraeus has been producing Clevios™ conductive polymers since more than 20 years in the ton scale. We are ready to support your production ramp-up of organic solar cells.

Heraeus Noblelight, your experts for UV and IR photonic processing, provides convenient solutions for high efficient drying and curing of all OPV materials fitting to your production process and environment. With infrared drying of printed or coated Clevios™ materials the specified conductivity values can be achieved within a few seconds process time.

Product	Conductivity / Sheet Resistance	Description
Clevios™ HTL Solar	0,1 – 1 S/cm	hole extraction/ transport layer
Clevios™ F HC Solar	> 500 S/cm	high conductive type
Clevios™ HY E	10 – 100 Ohm/sq	low resistive transparent electrode
SOL 530	< 20 mOhm/sq/mil	silver screen printing paste

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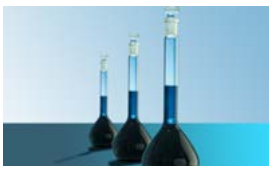
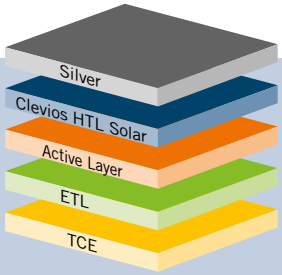
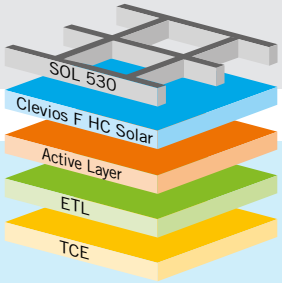


"Hole transport" layer (HTL) materials, improving the solar cell performance, ready to apply by slot-die coating. Clevios™ HTL Solar is applicable in both standard and inverted type organic solar cell architectures, exhibiting good wetting and coating properties on most active layer materials.

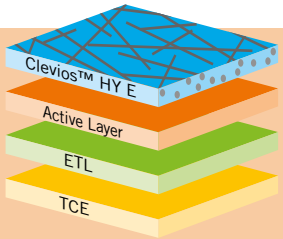


"Low-temperature silver paste", SOL 530, for screen-printing, which is compatible with Clevios™ products.



"Transparent electrode" materials, to replace ITO or to use as top electrode in semitransparent OPV cells, e.g. in combination with printed silver busbars. Clevios™ F HC Solar can be coated as single layer hole-extraction electrode directly on active layers. It facilitates manufacturing processes and can help to reduce overall solar cell costs.

"Hybrid transparent electrode" materials, are new development products for low resistive transparent electrodes with high workfunction and hole-extraction properties. Clevios™ HY E combines PEDOT/PSS with AgNW and can be coated as single layer directly on active layers.



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