

## Ultra Barrier Protection for Photovoltaic Applications Using Atomic Layer Deposition



Roll to Roll Atomic Layer Deposition capability at CPI

The Centre for Process Innovation (CPI) and ISOVOLTAIC are collaborating in the development of high performing barrier protection against water vapour and oxygen for photovoltaic (PV) applications using atomic layer deposition (ALD).

Nanomend partners CPI and Lappeenranta University of Technology are early adopters of roll-to-roll ALD technology. CPI aims to develop ALD ultra-barrier film for inclusion in the

transparent frontsheet encapsulation for flexible PV modules using roll-to-roll manufacturing methods needed for commercial viability.

The objectives for PV are to use ALD to improve process control and encapsulation which will lead to enhanced yields and extended product lifetimes in the roll-to-roll manufacture of lightweight, flexible PV modules.

## Specification

Properties		Test Method	Unit	Value	C.O.A
WVTR		NPL (RH=90%; T=35 °C)	g/m <sup>2</sup> d	≤10 <sup>-4</sup>	x
Thickness		Internal Method	Mm	0,125 ± 10%	x
Mass Per Unit Area		Internal Method	g/m <sup>2</sup>	177 ±10%	x
Tensile Strength	MD	DIN 53455/ASTM-D-882	N/mm <sup>2</sup> or MPa	≥155	x
	TD	DIN 53455/ASTM-D-882	N/mm <sup>2</sup> or MPa	≥155	x
Elongation at Break	MD	DIN 53455/ASTM-D-882	%	≥70	x
	TD	DIN 53455/ASTM-D-882	%	≥70	x
Shrinkage (30 min at 150 °C)	MD	Internal Method	%	≤0,2%	x
	TD	Internal Method	%	≤0,15%	x
Transmission at 450 - 800nm			%	>80%	x
UV (3000h) and DH (1000h) Resistance (Yellowing Index / L-a-b Values)				<5	-

## Key Features

ALD is a thin-film deposition process, normally at the nanoscale, which is characterised by exceptionally high levels of:

- Thickness uniformity
- Density
- Film perfection

## Market Applications

ALD ultra-barrier film can be applied to a wide range of flexible electronics products in order to improve their performance and lifetime. Some of the potential applications include:

- Flexible photovoltaics
- Flexible displays
- Flexible lighting

## Contact

CPI is interested in working with clients in the following areas:

- Photovoltaic manufacturers
- Barrier encapsulation of thin-film photovoltaics
- The application of Atomic Layer Deposition
- Product designers

For more information on the application of ALD to enhance barrier protection please contact:

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Full project title: Nanoscale Defect Detection, Cleaning and Repair for Large Area Substrates



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