



- 1 Roll-to-roll coFlex® 600 plant
- 2 Left: Anti-reflective PET film produced via the POLAR process; right: Untreated PET film

ANTI-REFLECTIVE POLYMER FILMS VIA ROLL-TO-ROLL PLASMA-ETCHING

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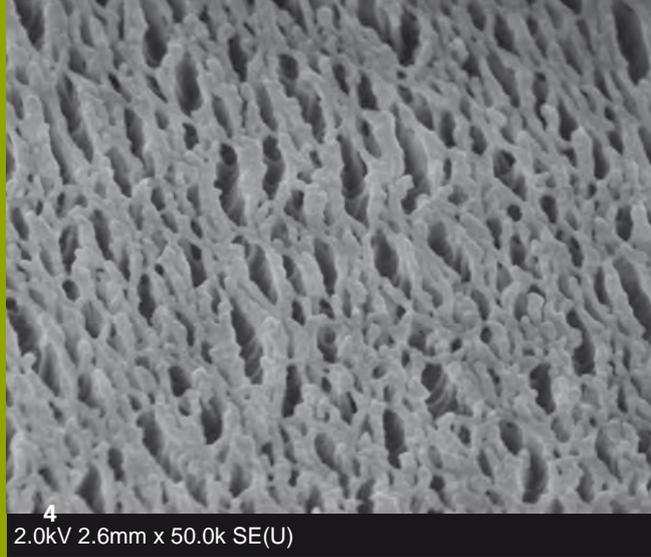
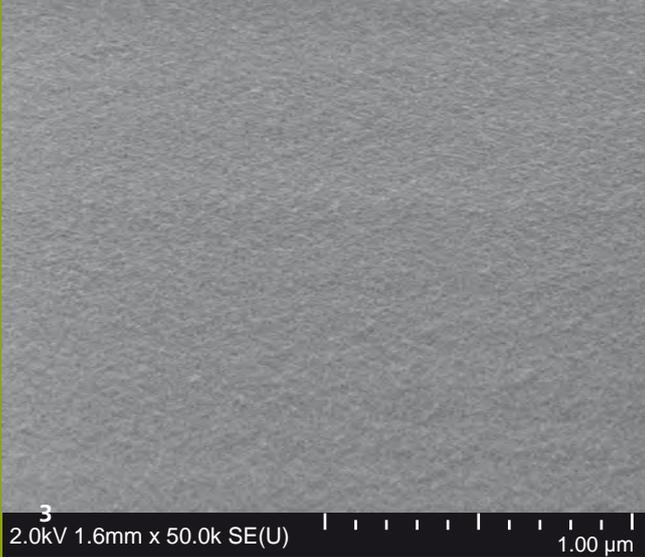
Polymer films are widely used in high-tech products. These products and applications include packaging, protective encapsulation of medicines and electronic goods, decorative elements, and also the realization of complex functions in displays or solar cells.

Polymers and air, however, have very different refractive indices. This means that, even for transparent films, light is partly reflected on both the front and back sides. For widely-used PET the reflection is 12 percent, and this value is higher than for glass. Making polymer films anti-reflective is particularly important for applications in electronics and architecture.

The Fraunhofer FEP, together with the Fraunhofer IOF and industrial partners, has

developed a method for making polymer films anti-reflective in an efficient roll-to-roll process. By using plasma-etching in vacuum equipment anti-reflective properties can be applied to polymer films in a more efficient way than with any other currently available process. The process is ideal for very thin polymer films, where the application of a multilayer anti-reflective layer system would adversely affect the film flexibility. Even curved substrates can be uniformly treated using this process.

The Fraunhofer FEP uses dual magnetron systems, which are normally used for coating, as plasma sources for a process which is stable over several hours in order to effectively render polymer films anti-reflective.



Processible polymer films

- polyethylene terephthalate (PET)
- triacetate cellulose (TAC)
- ethylene tetrafluoroethylene (ETFE)
- customer-specific substrates

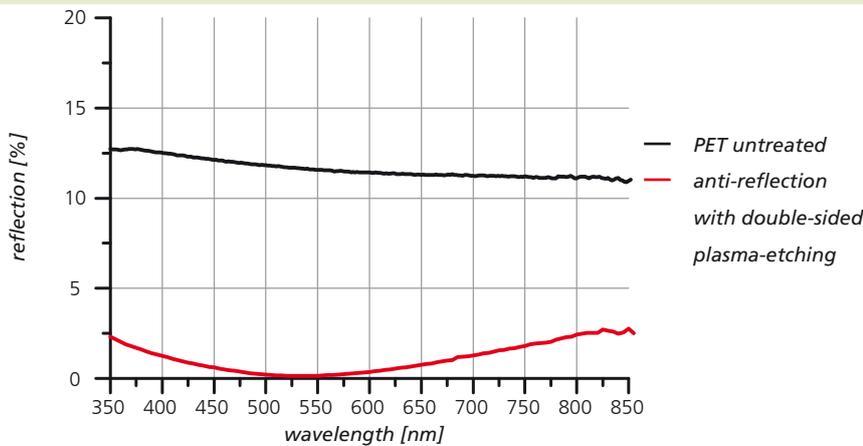
Applications

- architectural glass, for example for greenhouses and triple-glazing
- solar panels
- photovoltaic technology
- displays
- precision optical systems

Process

- roll-to-roll plasma-etching
- treatment speed: 0.5 m/min (per station, up to 6 process stations available)
- plasma sources: Dual magnetron systems
- treatment width: 600 mm
- residual reflection: 0.2 percent per anti-reflective side
- low dependence on the angle of observation

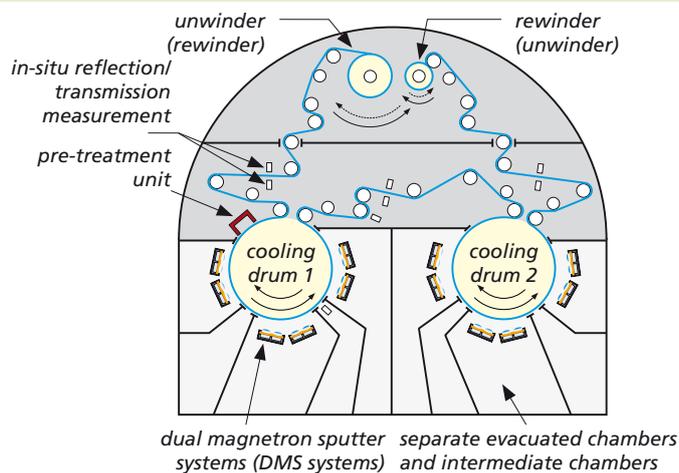
Reflection spectra of the PET films



Our offer

- feasibility studies
- samples for tests and pilot production
- technology and license transfer and modification of existing coating plants

Schematic representation of the coFlex® 600



Project website:

www.fep.fraunhofer.de/polar



- 3 SEM picture of an untreated PET film
- 4 SEM picture of a with Polar technology etched PET film



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