

sub-wavelength nanostructures fabricated on a pilot manufacturing line using self-assembling block copolymers



SUNPILOT



SUN-PILOT: Low cost nanotexturing for optical elements and automotive plastics

Microscopic surface textures can influence an object's appearance, softness, water repellency, and even smell. Nature has mastered this phenomenon, engineering structures such as antireflective moth eyes, water repellent lotus leaves, and exquisitely coloured butterfly wings.

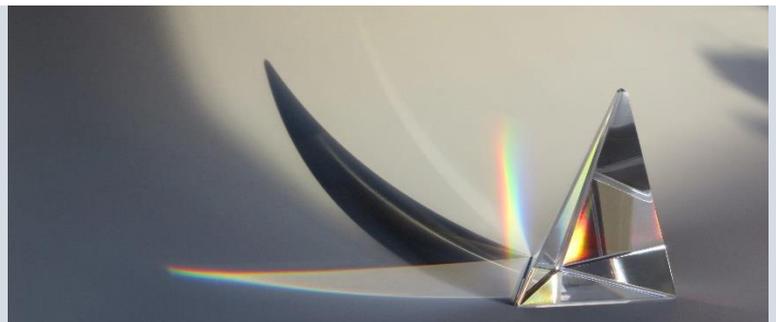
Whilst the theory of nanotexturing has been understood for over a century, no process exists to recreate its benefits on an industrial scale.

Funded through the European Union's Horizon 2020 research and innovation programme, SUN-PILOT will develop pilot-scale industrial processes for producing nanotextured products. Our primary commercial applications are in the optics and automotive industries.

Reflections at the interfaces between optical elements and their surroundings are a major cause of system impairment. Antireflection coatings comprising dielectric films are commonly used though these can be limited in terms of wavelength range and operational robustness.

SUN-PILOT will produce **anti-reflective nanostructures** on common optical glasses at pilot scale for specified spectral ranges.

Approximately 350,000 people are employed in the optoelectronics sector across Europe.



Optics

Antireflective surfaces on flat and curved optical elements

Anti-glare, self-cleaning and soft-touch vehicle trims will demonstrate the project technology.

Nanotextured injection moulded parts will be **lighter and cheaper to produce** than lamination methods. Nanotexturing should also **improve the recyclability** of plastic parts finished by the SUN-PILOT process.

The automotive industry is a major consumer of injection-moulded plastic parts. Around 18,000 companies employing about 125,000 people are involved in plastic injection moulding across Europe.



Automotive

Tactile and self-cleaning injection moulded plastic parts

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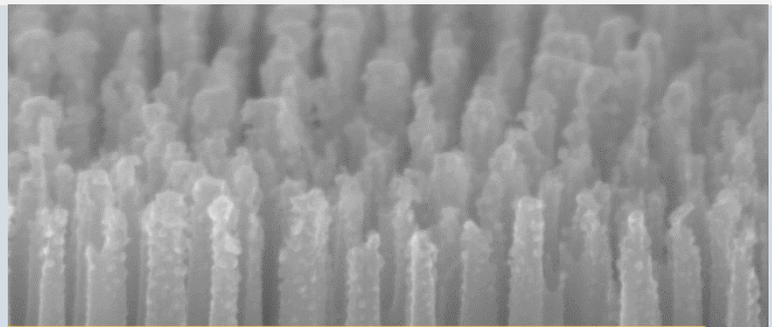


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Can you imagine a world where smartphone screens don't reflect ambient sunlight, and vehicle dashboards clean themselves? Sub-wavelength nanotexturing can achieve this.

Light rays are reflected by abrupt changes in speed as they travel from one medium to another. Antireflection surfaces can be created using tapered sub-wavelength nanostructures. Similar features also give plastics soft-touch and self-cleaning properties.



Subwavelength structures

Subwavelength structures suppress light reflections

Block copolymer (BCP) nanomasking is the building block of SUN-PILOT. Developing ultra-high molecular weight BCPs will be central to the formation of the sub-wavelength patterns with controlled dimensions.

These masks will be used in conjunction with wet and dry etching processes to transfer nanotextures to the surface of optical lenses and injection mould internals.

Mask characteristics such as periodicity, thickness, geometry and feature size will be optimised for the target applications and transfer technique.



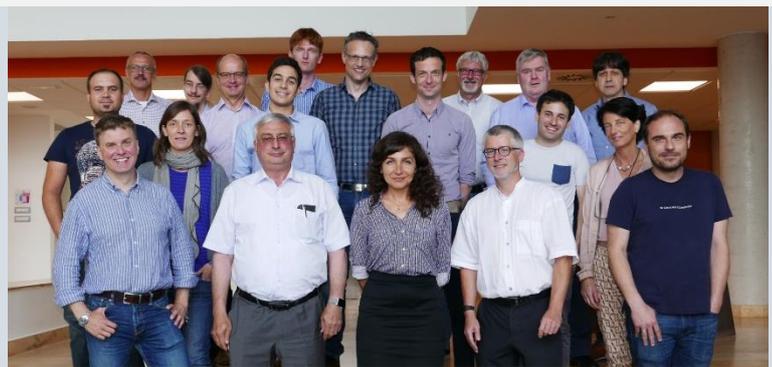
Block copolymer nanomasking

Scalable low-cost production leveraging polymer chemistry

SUN-PILOT Partners extend the entire innovation cycle from research to industrial application. Fundamental research is led by Trinity College Dublin, Fraunhofer Institute for Applied Polymer Research, TecNALIA and the University of Bordeaux.

SMEs including Irish Precision Optics, AMO GmbH, and Microresist Technology GmbH, contribute specialist materials and process knowhow. Coherent Inc, Qioptiq, NKT Photonics and Grupo Antolin will accelerate knowledge transfer and exploitation in the optics and automotive markets respectively.

Risk and life cycle assessments will be performed by Vertech Group, whilst commercialisation advice is provided by Elucidare Limited.



Partners

Spanning the entire innovation and adoption cycle

