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Biomimetic.

Multi-functional laser-induced deep nano-structuring on glass

Evangelos Skoulas, CTO

info@biomimetic.gr

EPIC European Photonics Industry Consortium

Meeting Laser Surface Functionalization

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Who we are?

- Spin-Off company from the F.O.R.T.H | I.E.S.L | ULMNP Lab
- Established in September 2020
- Focused on laser surface functionalization

Science and Technology Park, Nikolaou Plastira 100, Heraklion ,Crete ,Greece, 70013

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Our Team

Dr. Emmanuel Stratakis

CEO

Research Director at IESL - FORTH with over 10 years of experience on biomimetic surfaces

Specialist in the laser processing of metallic and semi-conductive materials

Dr. Evangelos Skoulas

CTO

Specialist in the development of optical devices and laser processing of materials

Materials Engineer

Specialist in the laser processing of transparent materials and dielectrics

Mr. Andreas Lemonis

CIO

Specialist in automation of optical devices

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TettiX

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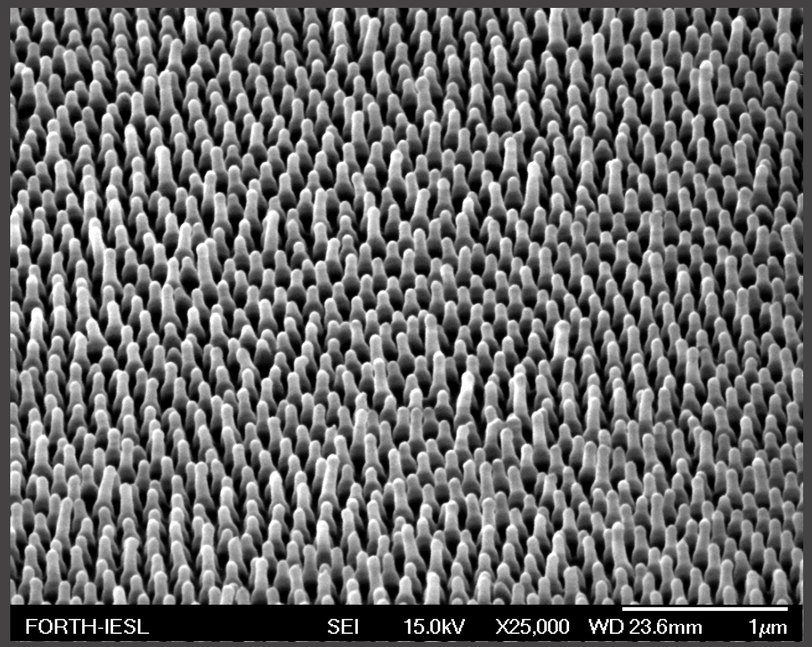
Tettix Anti-Reflective (AR) glass

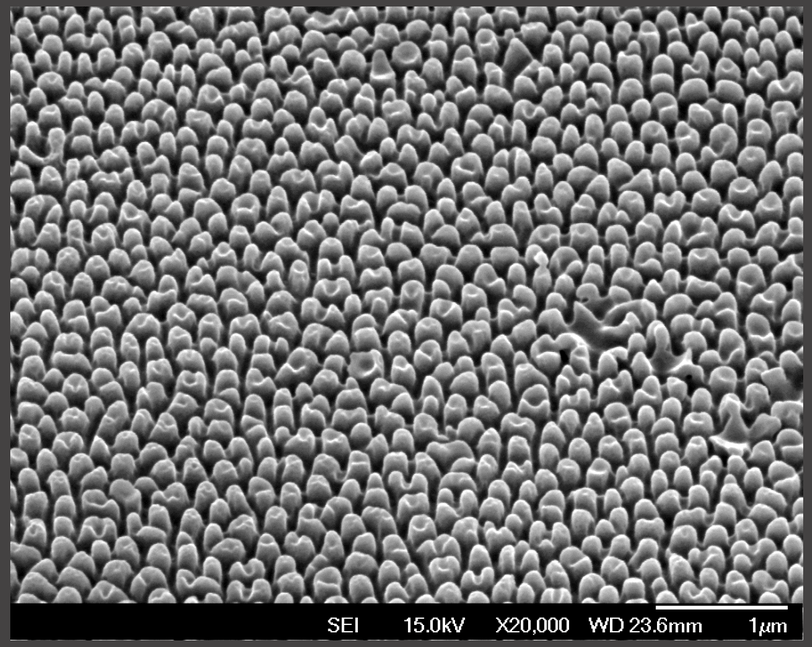
Natural



Tettix AR glass is produced by applying the biomimetic Tettix laser treatment directly on glass substrates in order to minimize surface reflection while enhancing its transmissivity over a wide spectrum and for various angles of incidence.

- Combines high-performance **Anti-Reflective** with **Anti-Glare properties**
- Average reflection <1% for visible and IR
- High transmittance >99.5% for visible and IR

Artificial



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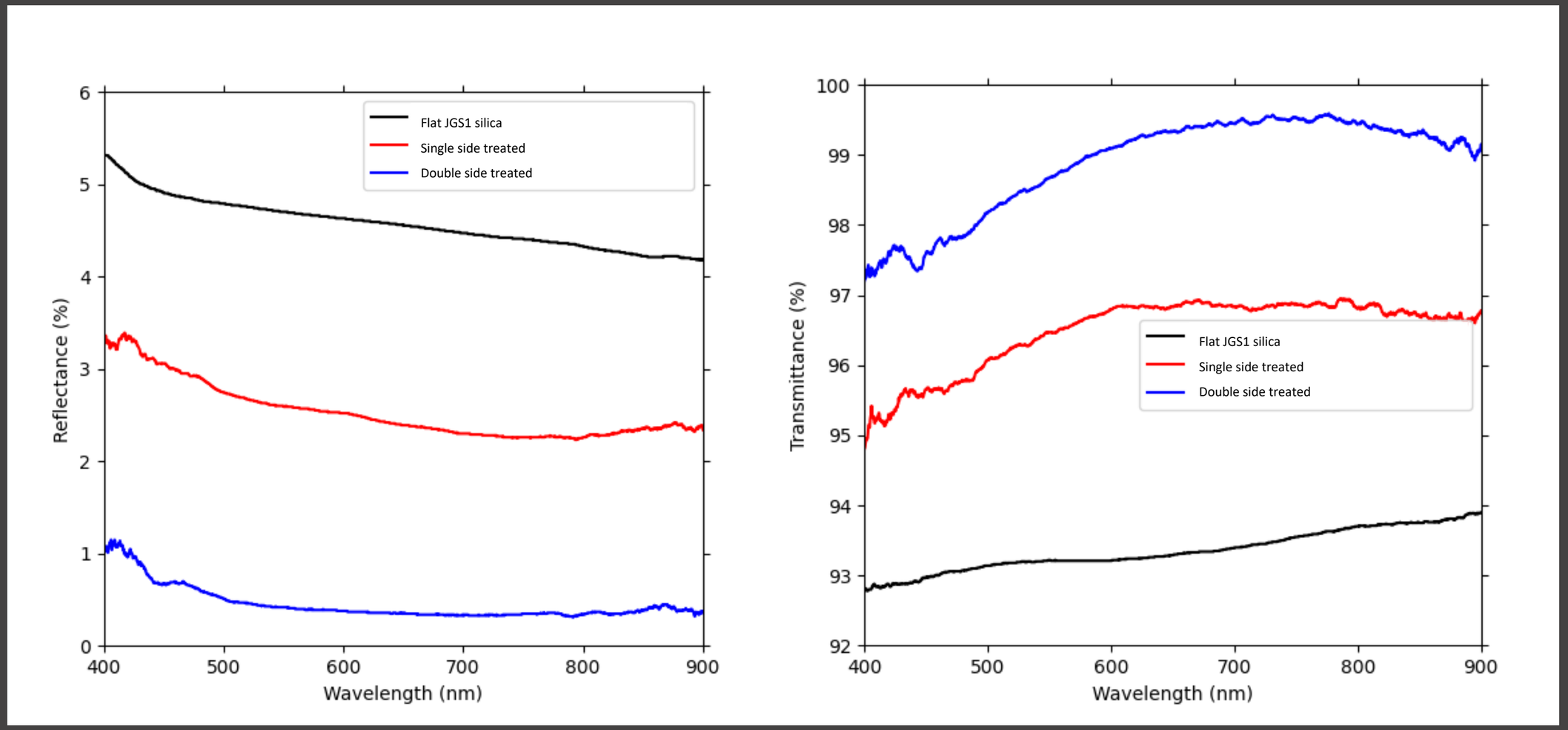
Tettix Anti-Reflective (AR) glass



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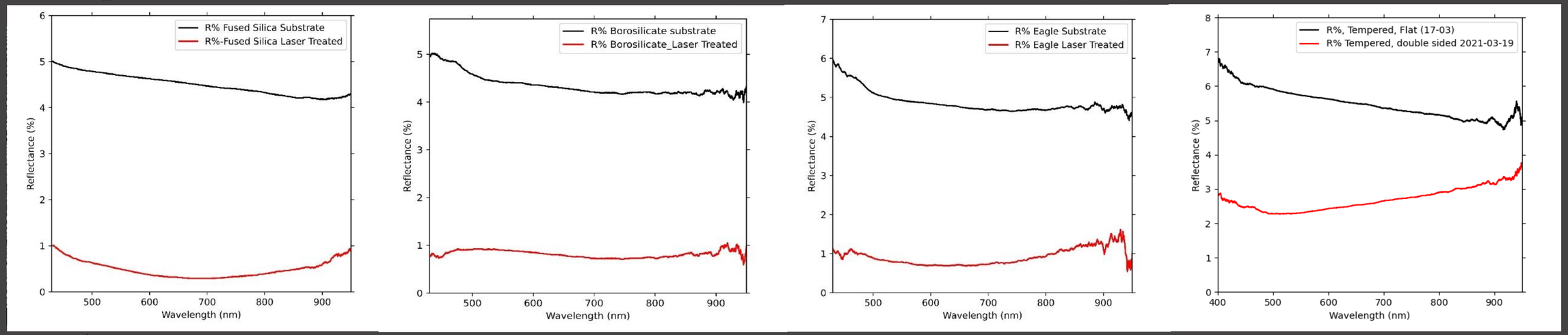
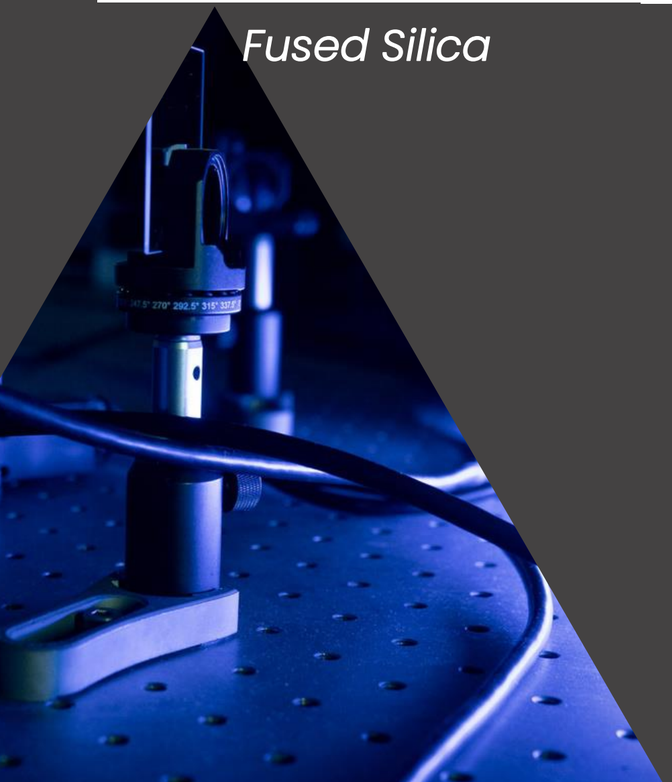
Single Process – Multiple Glass Types



Fused Silica *Borosilicate glass* *Eagle glass* *Float glass*



Key advantages of Biomimetic's technology:

01 Fully automated "push-button" process

02 No use of toxic chemicals or vacuum conditions

03 Low cost, selective process.

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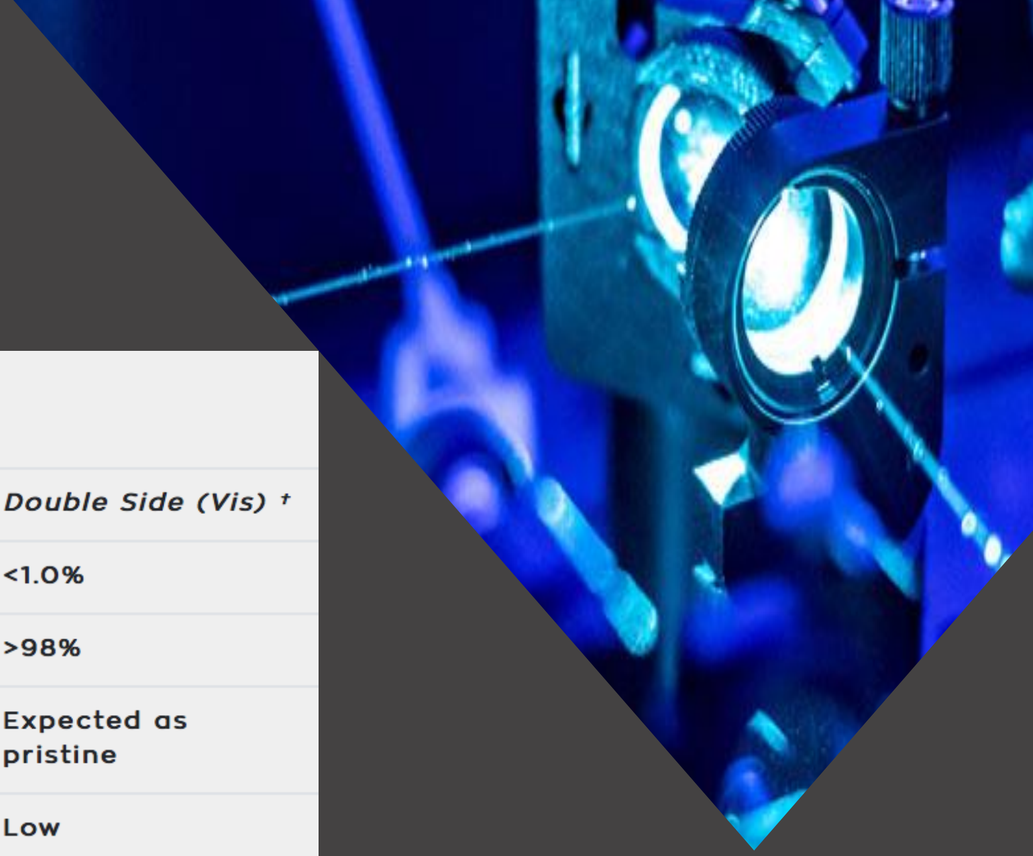
Use Case Optics



Fused Silica

	*Single Side (IR) **	*Single Side (Vis) †*	*Double Side (IR) **	*Double Side (Vis) †*
Reflectivity	<2.6%	<2.9%	<0.5%	<1.0%
Transmittance	>96%	>94%	>98%	>98%
Ablation threshold	Expected as pristine	Expected as pristine	Expected as pristine	Expected as pristine
Scratching resistance‡	Low	Low	Low	Low
Haze	Tunable	Tunable	Tunable	Tunable
Size	Up to 24.5 x 24.5 cm	Up to 24.5 x 24.5 cm	Up to 24.5 x 24.5 cm	Up to 24.5 x 24.5 cm
Thickness	>700μm	>700μm	>700μm	>700μm

* Infrared: 700 – 1000nm
† Visible: 400 – 700nm
‡ Abrasion test: CS-8

Haze tunability: 0.2 – 12.5

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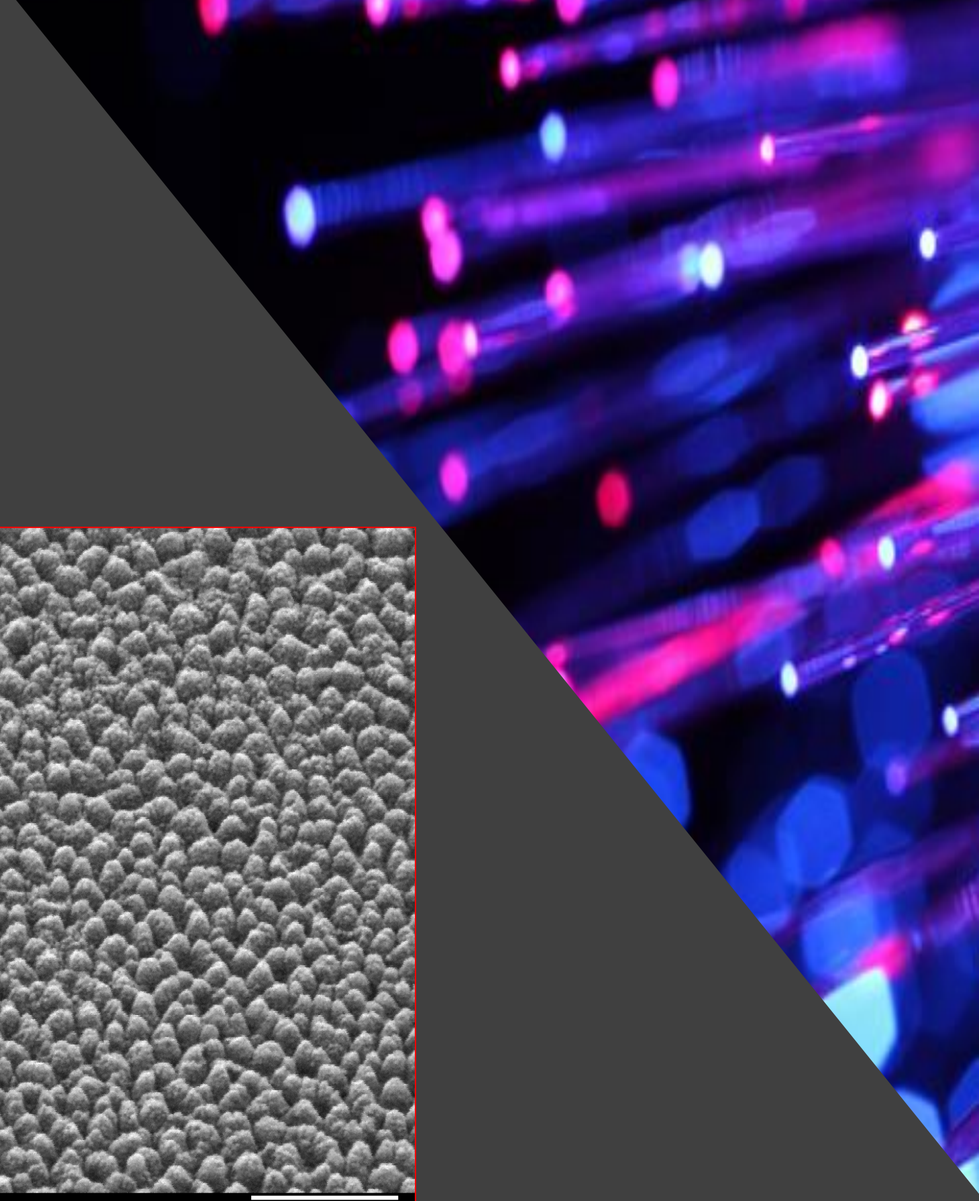
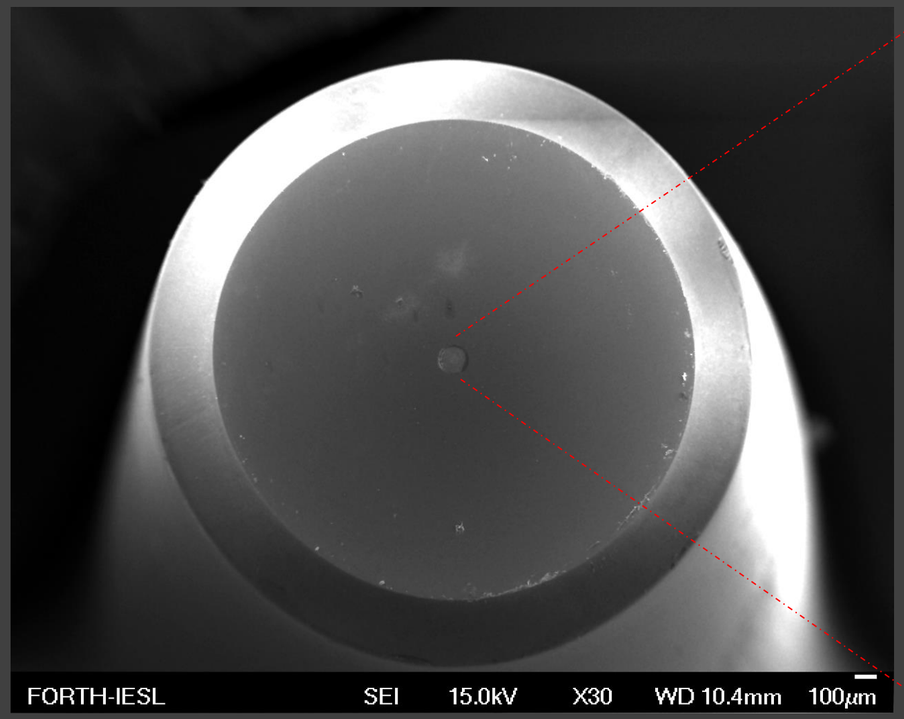
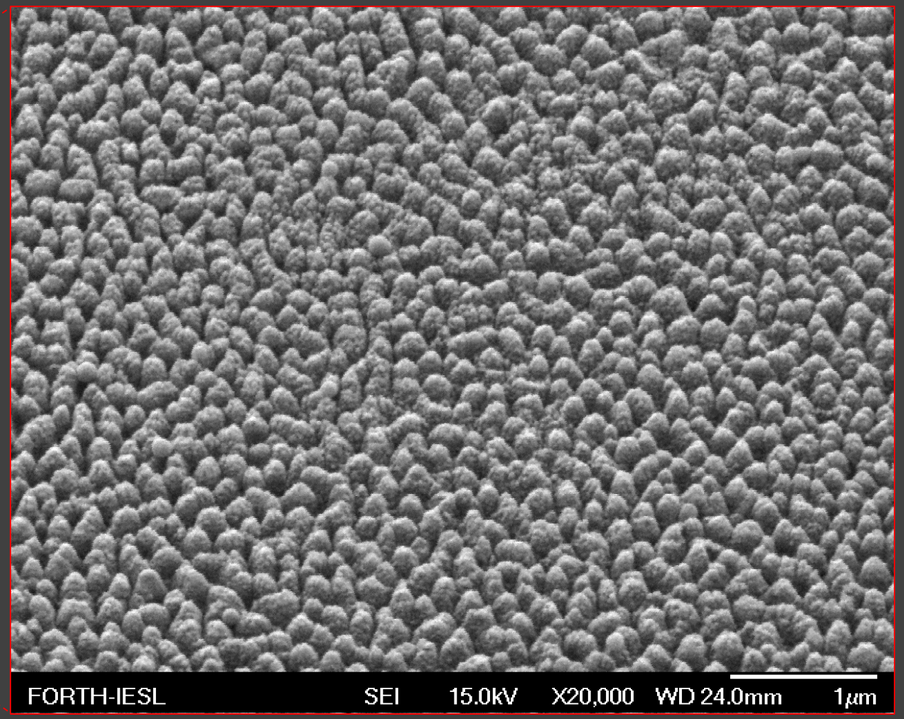
Use Case Optical Fibers







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Tuning AR effective wavelength

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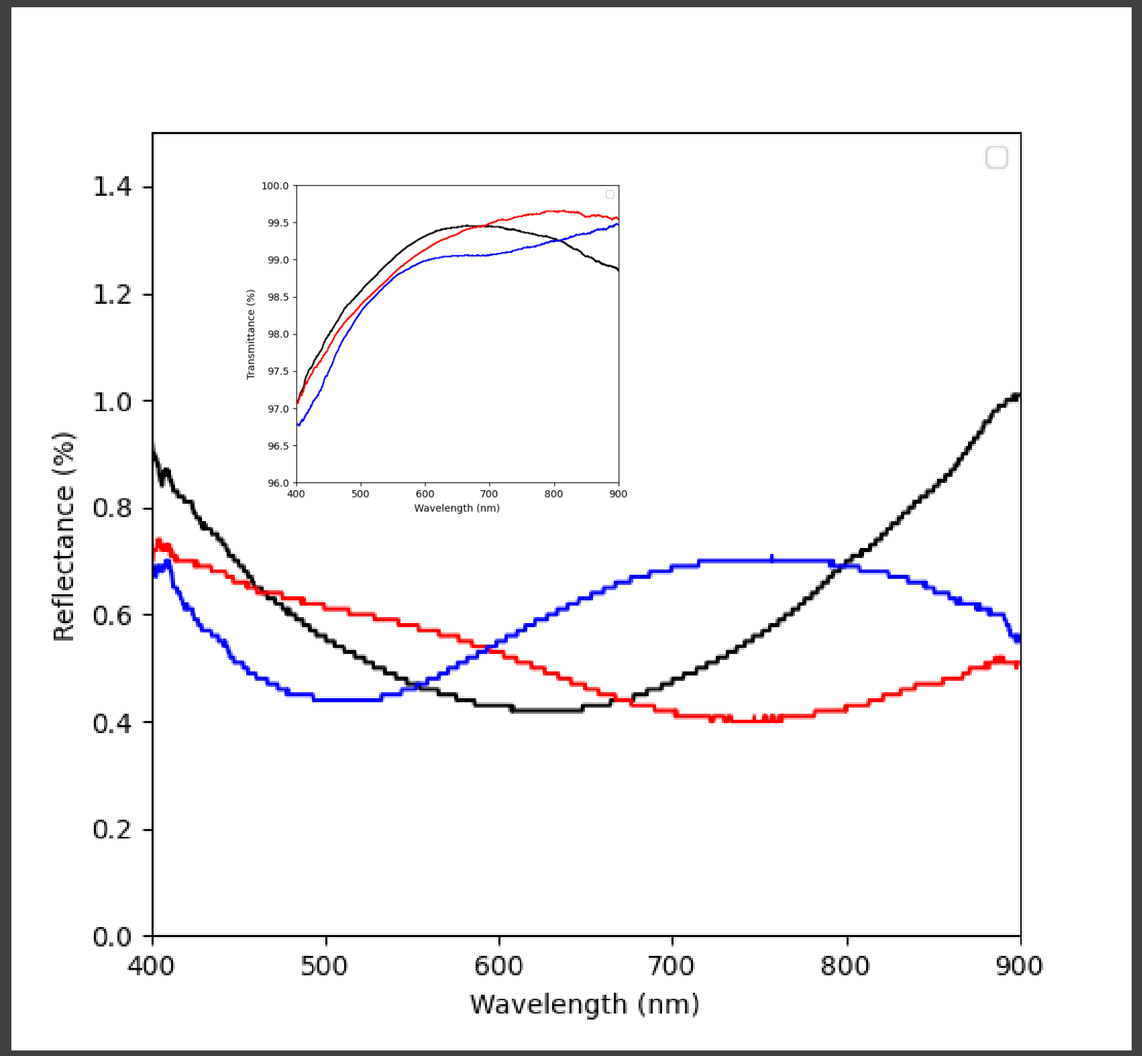
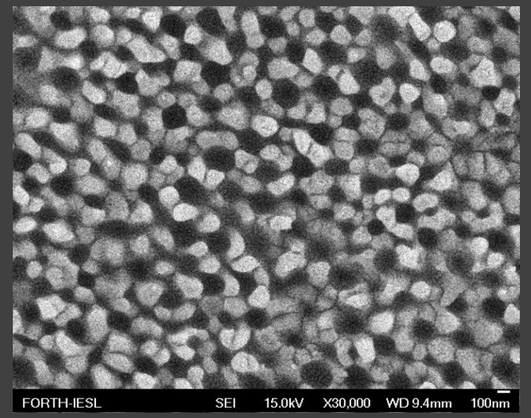
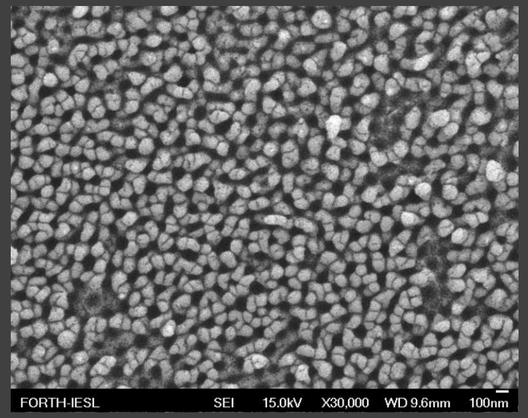


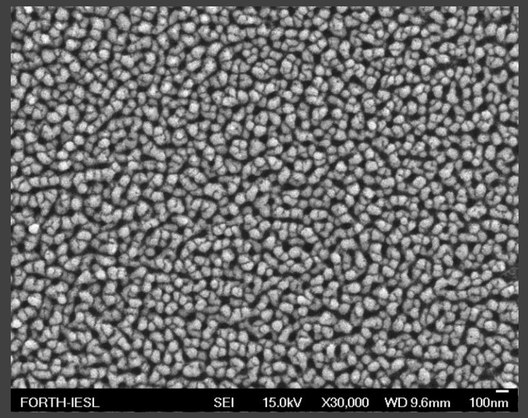
Nano-structuring
Periodicity ~250nm



Nano-structuring
Periodicity ~150nm



Deep Nano-structuring
~50nm



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Tettix Anti-Fogging (AF) glass

Tettix AF glass combines anti-reflective with anti-fogging and superhydrophilic properties, showing reflectivity of less than 1% and a water contact angle of less than 10 degrees. Tettix AF is the worlds' first anti-reflective/anti-fogging glass produced exclusively via a green laser texturing process, without using any chemicals.

Process Features

- Combines anti-reflective with anti-fogging and superhydrophilic properties
- Tunable optical properties
- Water Contact Angle < 10°
- Push-button process
- Low-cost
- No chemicals and consumables
- Green process

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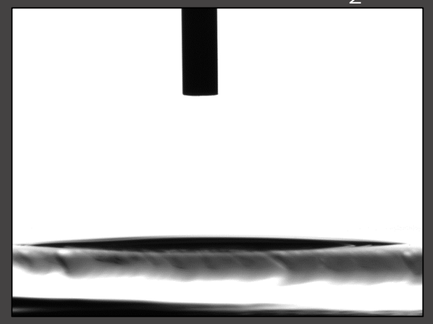
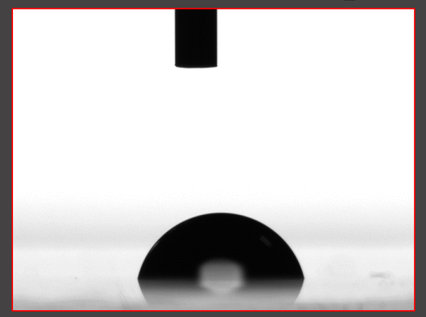
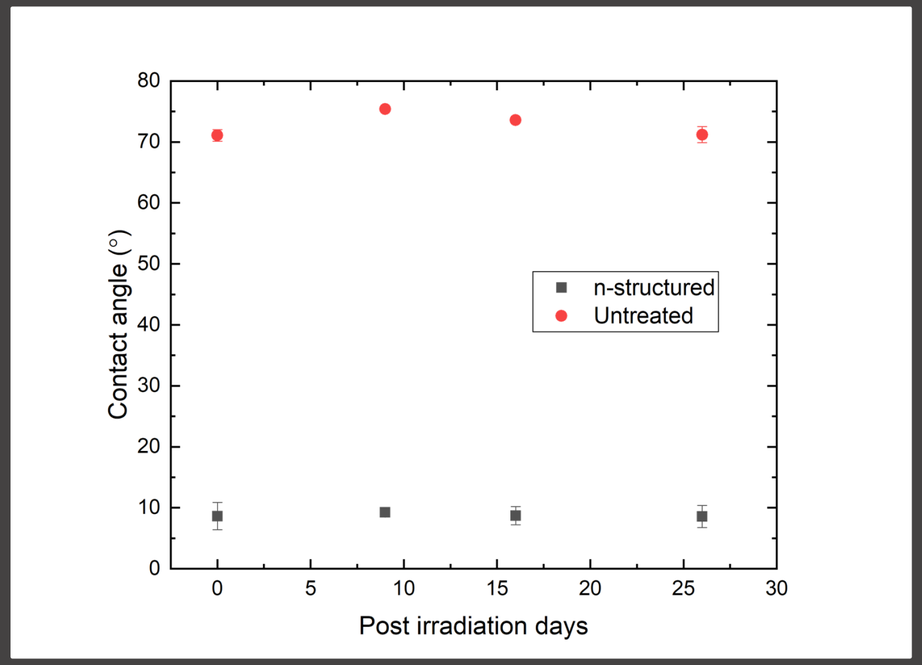
Tettix Anti-Fogging (AF) glass

Laser Treated SiO_2



Untreated SiO_2





Thank You

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Biomimetic.

"Nature's ingenuity on surface engineering"

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