Insplorion

Sensors

- *NPS is ideally suited to study the influence of surface topography and/or chemistry on surface processes.*
- *Surface chemistry, structure and curvature influence molecular adsorption as well as the structure and composition of adsorbed layers.*
- *A variety of sensor coatings is available, providing the possibility to tailor the surface chemistry.*
- *Insplorion offers sensors with different surface structure and curvature by varying the size and shape of the plasmonic nanostructures.*

Insplorion sensors

Insplorion provides nanoplasmonic sensors, which enable ultrasensitive measurements of refractive index changes close to (< 30 nm from) the sensor surface. The sensors can be coated with a range of materials, which allows studies of how surface chemistry influences processes such as molecular adsorption and thin film phase transitions. Insplorion offers also plasmonic nanostructures of various types and sizes, allowing the user to perform systematic studies of how surface processes are influenced by the surface topography/structure.

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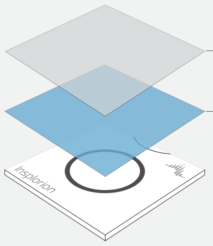
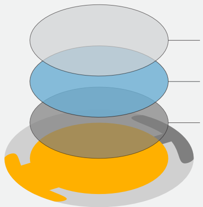
XNano/X1 sensors



The dimensions of XNano and X1 sensors are 9.5x9.5x1 mm. The NPS sensing structure is deposited on a fused silica substrate. The sensor surface can be covered by a top coating if desired.

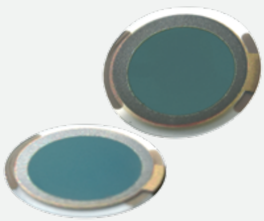
The sensing structures are distributed evenly over the surface.

Acoulyte sensor



Acoulyte sensors are QCM-D sensors with a SiO_2 spacer layer deposited on the top gold electrode. The NPS structure is then deposited on top of this layer. The sensor surface can be covered by a top coating if desired.

The diameter of the Acoulyte sensors is 14 mm. The NPS sensing structures are evenly distributed over the surface.



Nanostructured sensors

Insplorion's nanostructured sensors are produced in a state of the art clean room facility, which guarantees stability, reproducibility and well controlled surface chemistry. The nanostructures cover the whole sensor area, forming a quasi random pattern on the surface. The structures are uniform in size and shape. On Insplorion's standard sensors, the nanostructures are made of gold but other metals are available upon request. The nanostructures can be ordered uncoated or covered by a thin top coating.

	Top coating	*Nanostructure type*	*Nanostructure material*	*Temperature range*	*Plasmon peak position*
Standard	Si_3N_4, SiO_2, Al_2O_3, TiO_2	Discs (protruding), embedded discs (flat surface)	Au	RT-150˚C	700-780 nm**
Upon request	E.g. AZO, IOH, iron oxides, porous Al_2O_3	Spherical facetted particles*, rings, cones, holes, wells, caves*	Ag, Al, Cu, Pd, Pt	RT-600˚C*	500-1100 nm

** not available for Acoulyte sensors*
*** in water*

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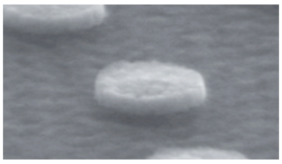
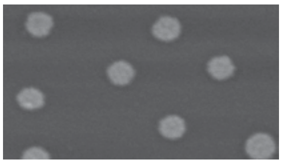
Standard sensors

Discs (protruding)

Disc diameter: 100 nm*

Disc height: 20 nm**



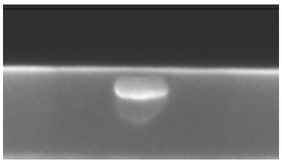


Embedded discs (flat surface)

Disc diameter: 100 nm

Disc height: 20 nm

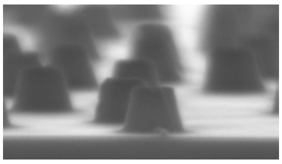
Thickness of silicon dioxide layer above the gold nanodiscs: 5-10 nm



Structures made upon request

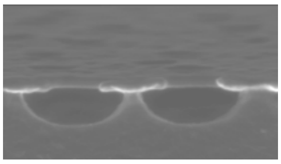
Cones/ truncated cones

Base diameter: 60-200 nm
Cone height: ≤ 0.8 x diameter
Sidewall angle: 30˚ off normal



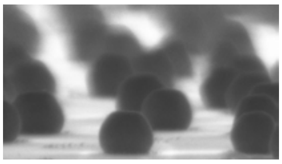
Caves

Hole diameter: 60-160 nm
Depth: 30-120 nm



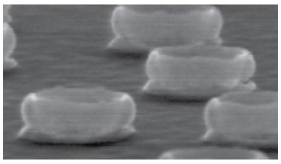
Spherical facetted particles

Diameter: 60-200 nm



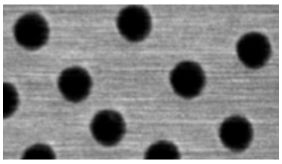
Rings

Outer diameter: ~ 50 nm
Inner diameter: ~ 30 nm
Ring height: ~ 20 nm



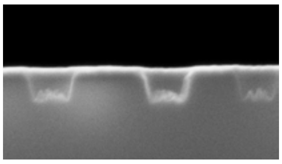
Holes

Hole diameter: 60-200 nm
Hole depth: ≤ hole radius



Wells

Diameter: 70-160 nm
Depth: 50-200 nm



** Diameters 60-200 nm are available upon request.*

*** Heights 10-30 nm are available upon request.*

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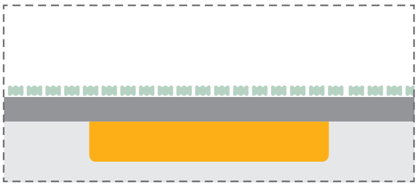
Examples

Protruding and embedded gold nanodiscs

The influence of surface structure on protein adsorption, polymer phase transition temperatures and supported lipid bilayer (SLB) formation has been investigated by comparing the results obtained on sensors with standard protruding gold nanodiscs with those on sensors with embedded gold nanodiscs (flat surface sensors).

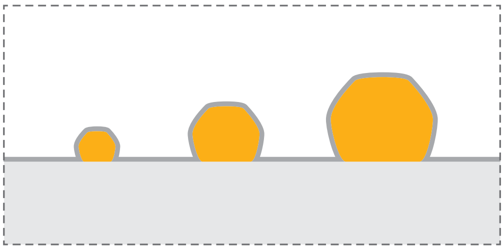
See application note # 29 for further information.



Biocorona formation on silica nanoparticles

Spherical facetted nanoparticles have been used for in situ characterisation of molecule-nanoparticle interactions. The nanostructures were coated by SiO_2 to mimic silica nanoparticles in solution. In this study the role of flat versus curved surfaces on the facetted nanoparticles in protein corona formation was quantitatively analyzed by using spherical structures with different diameters and, consequently, different flat/curved ratios.

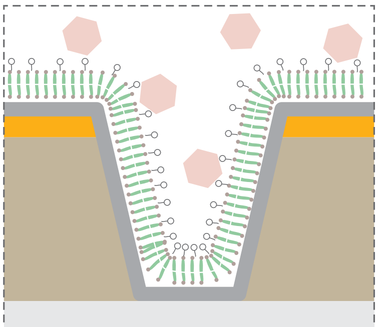
See application note # 28 for further information.



Protein adsorption to lipid membranes with negative curvature

Using nanowell structures it is possible to distinguish the signal arising from molecular binding inside the holes from that of molecular binding to the flat top surface. The nanowells have been used to study how the binding of proteins to lipids is affected if the membrane has a negative curvature.

See application note #22 for further information.



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