MATISS1, first results

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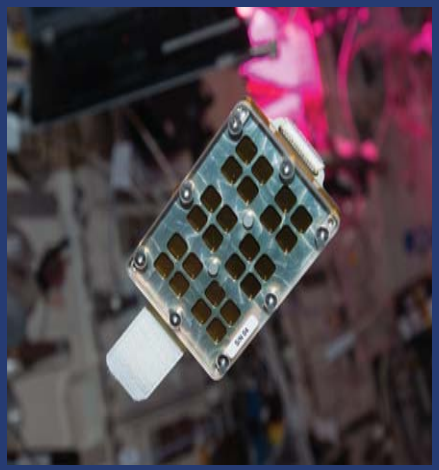
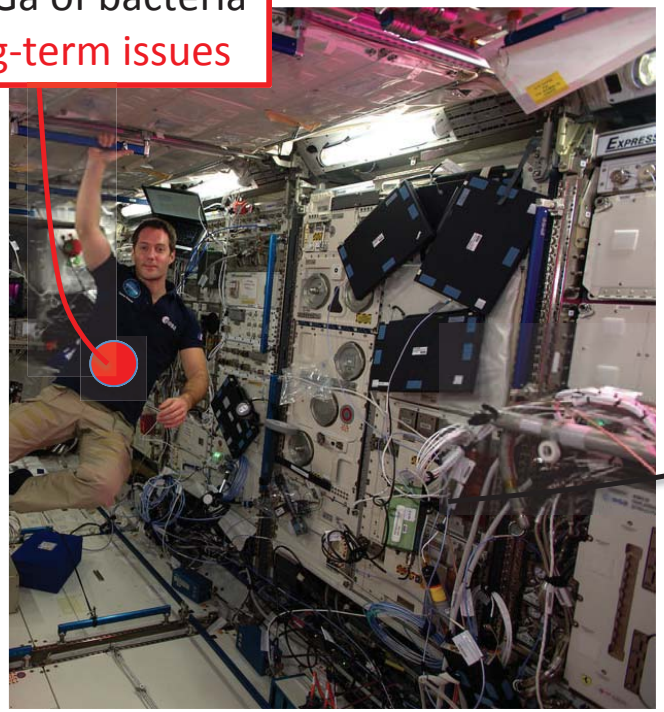


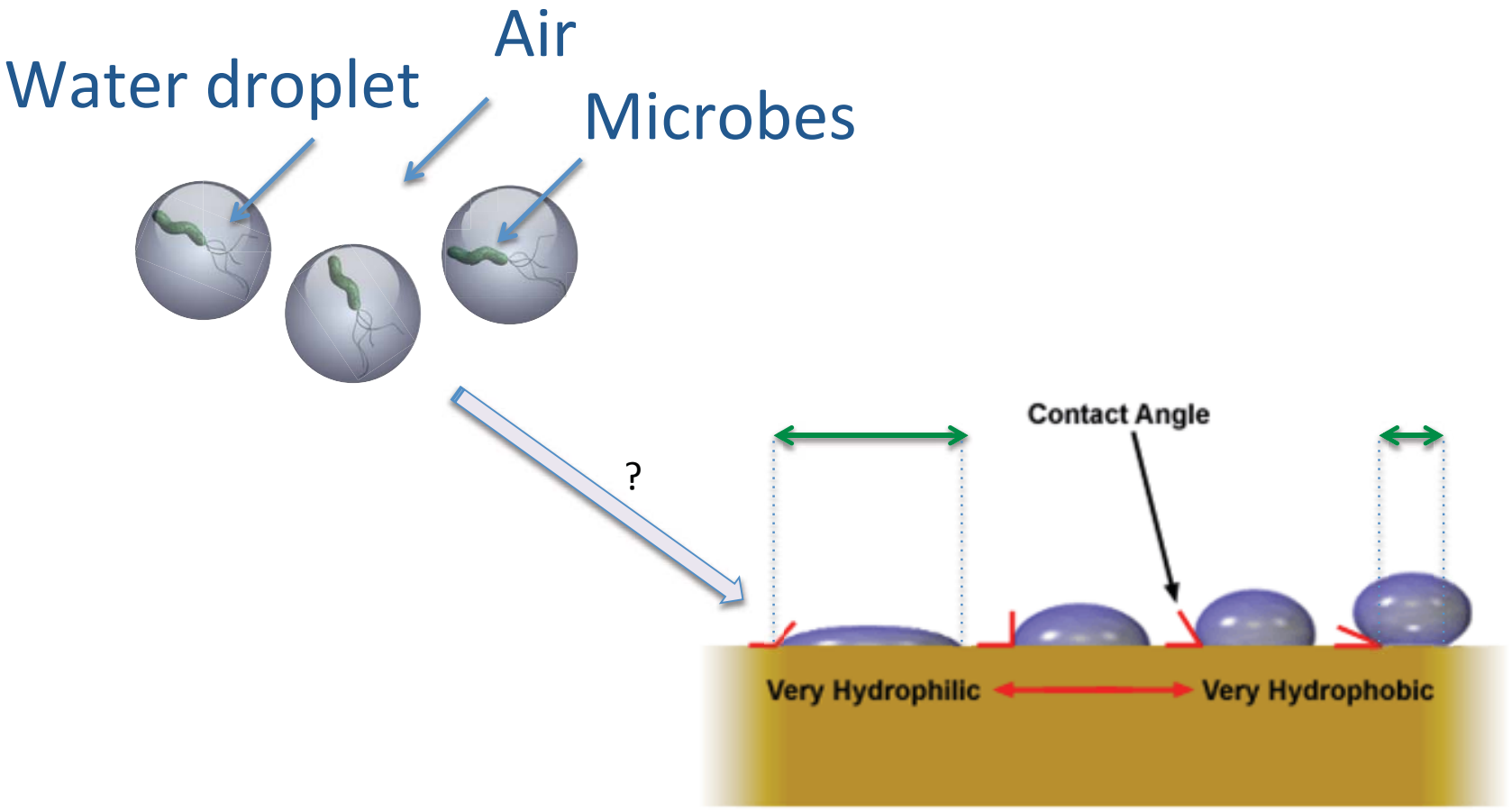
The ISS, a confined and bio-contaminated environment



Closed-loop life support systems

Materials / processes to reduce contamination

Hydrophobicity to reduce surface contamination?



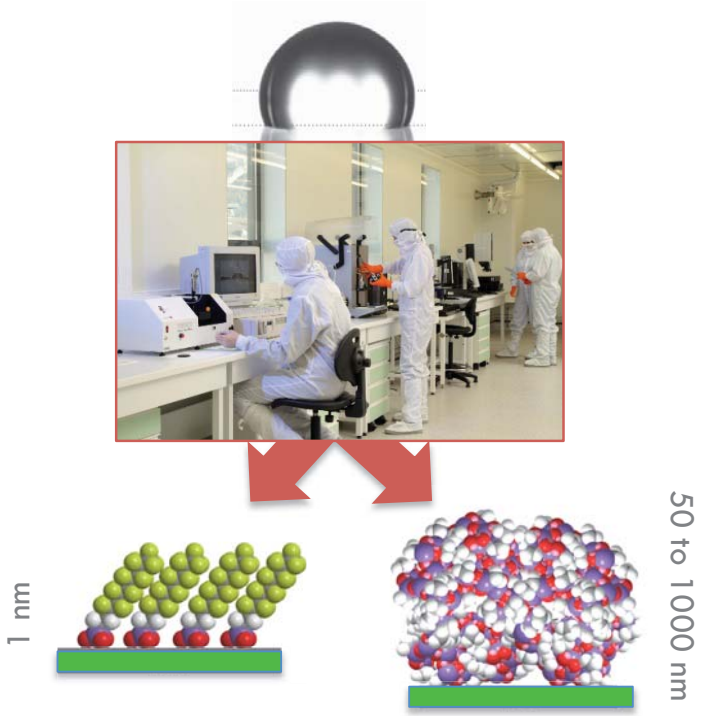
Goal: test whether the contamination of hydrophilic and hydrophobic surfaces exposed in the ISS are different.

Hydrophobic innovative surfaces of silica glass

Silica glass lamella

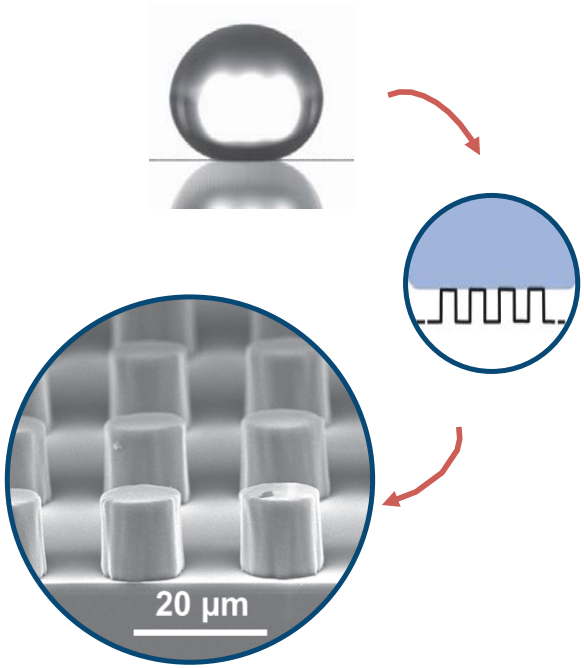
Uniform and inert nm-thick layers

Controlled processes in vapor phase



Patterned hybrid silica layer

Patterning of surface



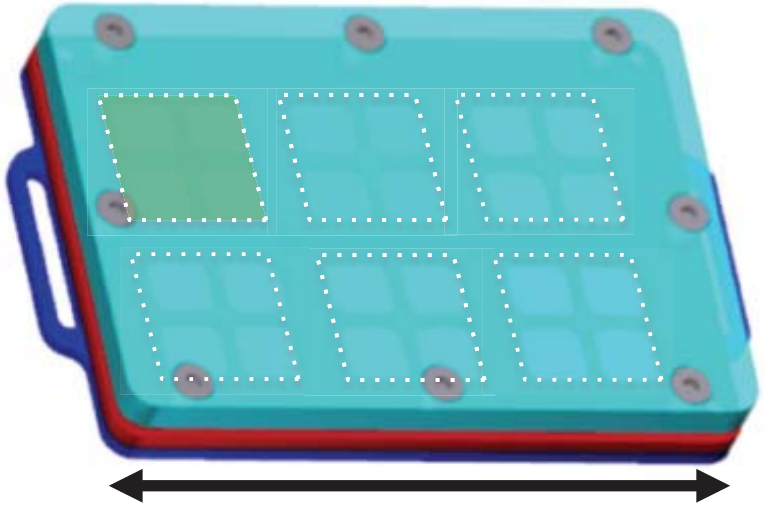
Know how

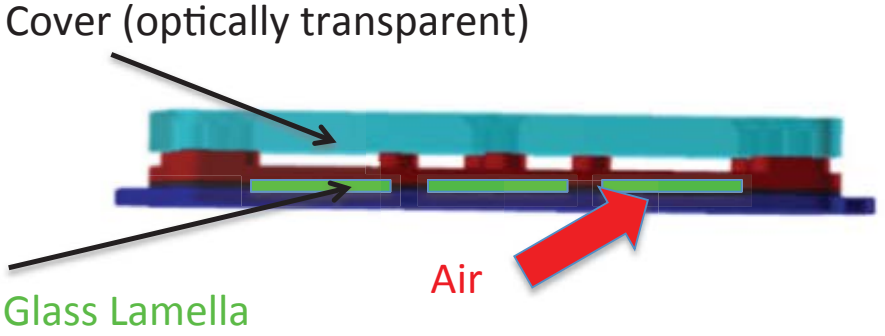
Know how

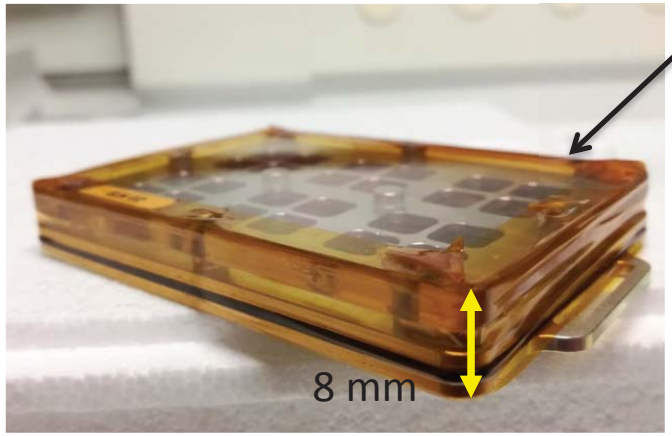
SURFACE DU VERRE ET INTERFACE

Joint Laboratory

The safe exposure of 6 glass lamella in the ISS

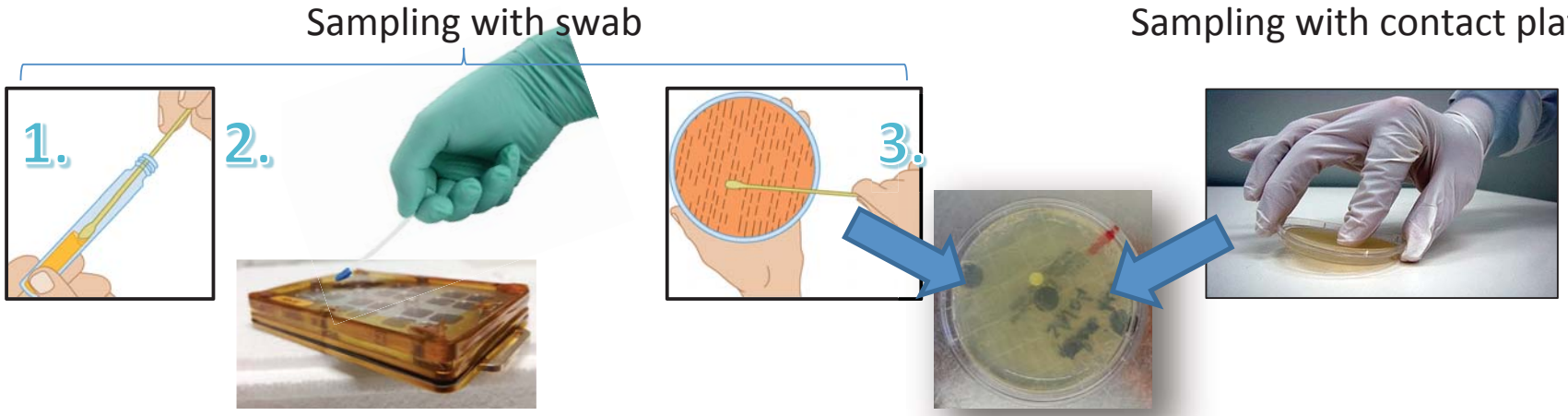


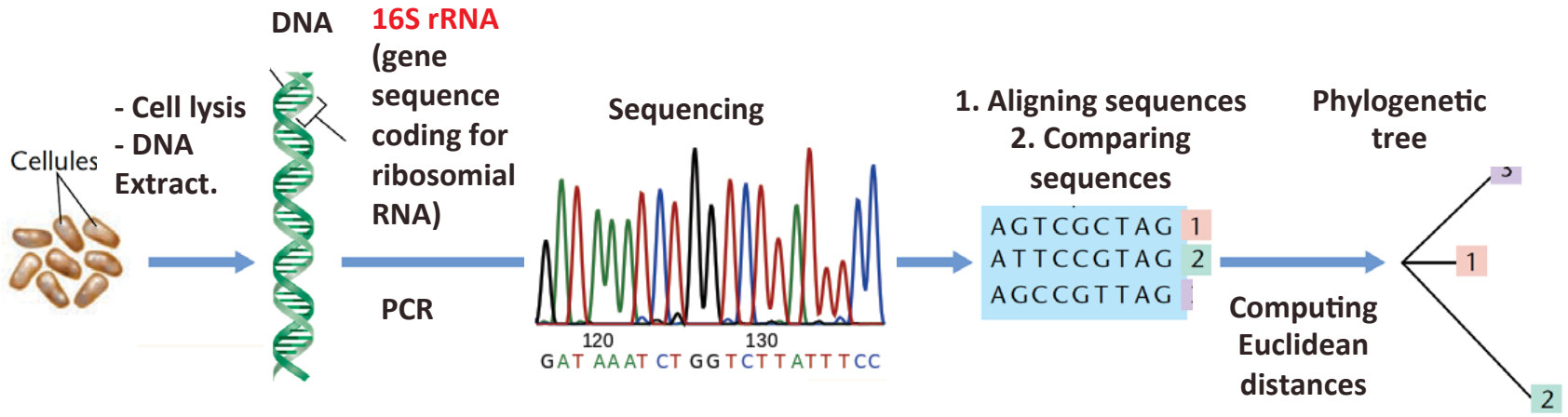




Protocol of analyses under confinement for MATISS2

Microbiological investigations of the external surfaces

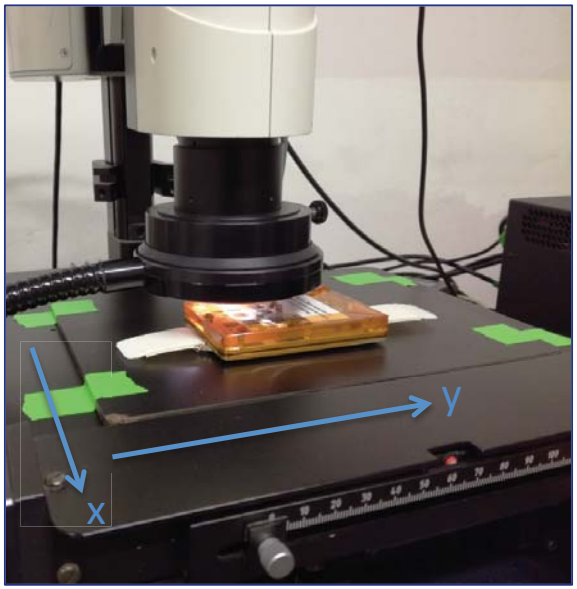




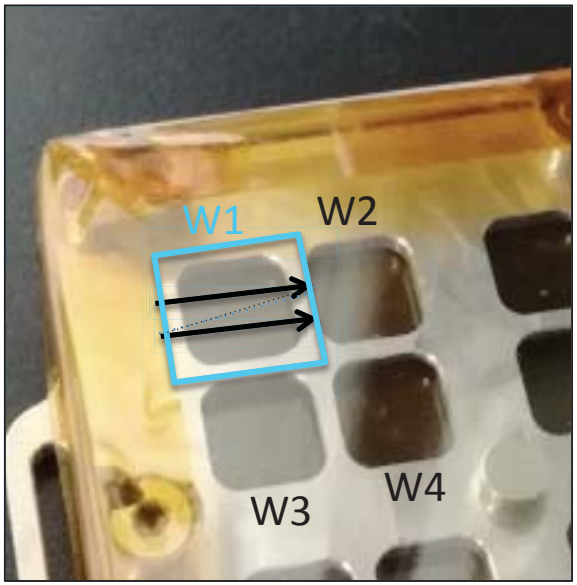
Microbial strains classically detected on skin

Scanning microscopy of the surfaces under confinement

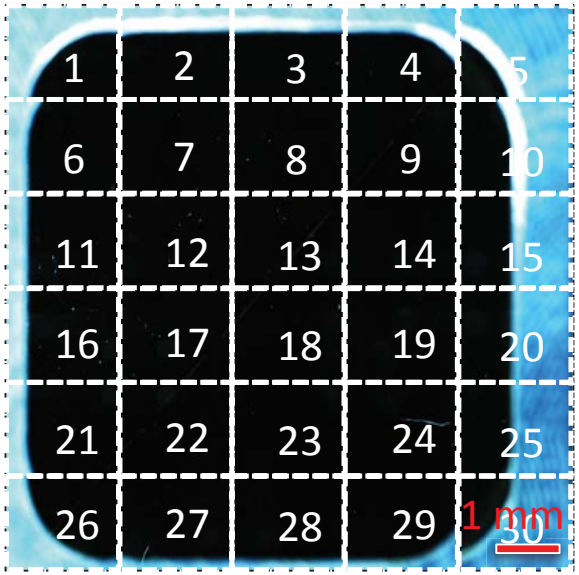
Long working distance



SM of 4 W

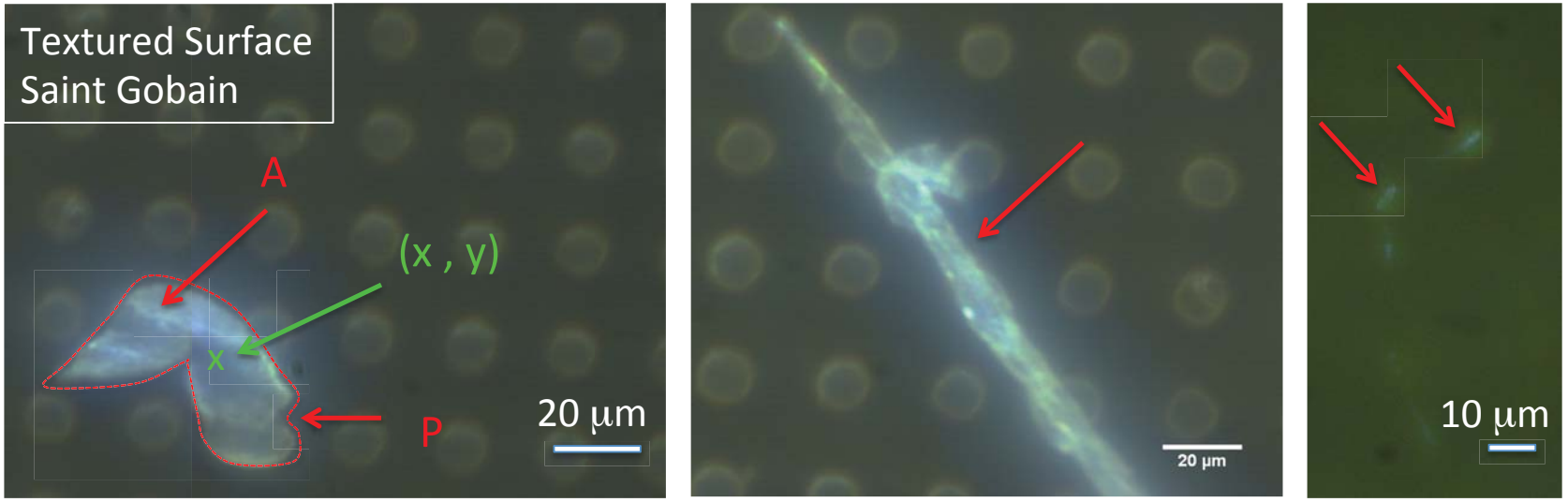


W's mosaïcs (8x8 mm^2)



- Low Zoom (x 3.5) ≈ 2000 images
- High Zoom (x 30) ≈ 200000 images
- Ultra High Zoom (x 100) (on-going)

The geometry of the ISS's particles



- ✓ Imaging analysis: i th : A_i , P_i, … : geometrical properties and sets
- ✓ First results

Low Zoom (⦸ > 15 µm)

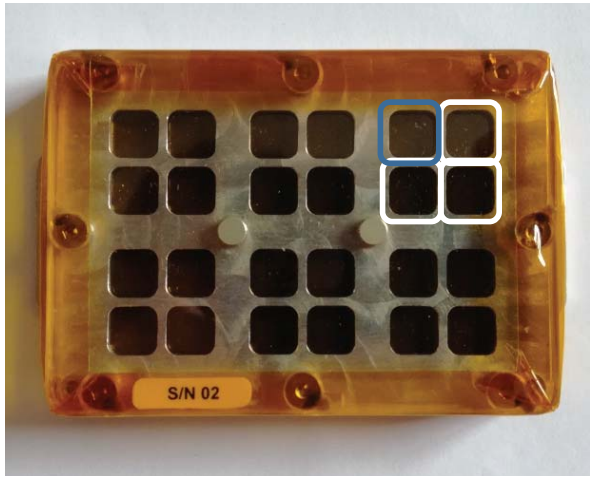
n ≈ 18000 particles

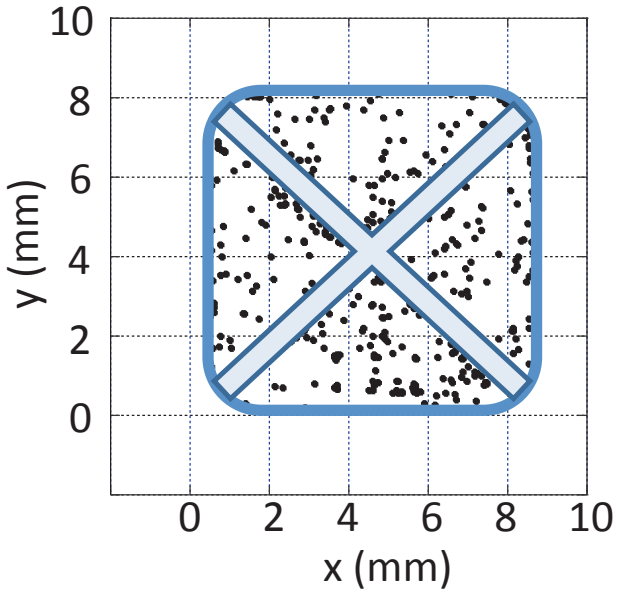
< d > ≈ 400 particles / cm^2 , ≈ 4 particles / mm^2

< τ > ≈ 10^{-2} % / month , ≈ 10% in 100 years

The distributions of the ISS's particles

✓ Particles positions : densities and heterogeneities for every windows





✓ Density and heterogeneity comparisons

- holders in two locations : particle dynamics in the ISS
- from the duplicated holders : sensitivity of our methodology
- from the 6 lamella in one holder: surface treatments

Conclusions and perspectives

- Conclusions : Biocontamination and optical analyses under confinement

On-going work, tools are developped

Low Zoom ($\varnothing$ > 15 µm)
n ≈ 18000 particles
< d > ≈ 400 particles / cm^2 , ≈ 4 particles / mm^2
< τ > ≈ 10^{-2} % / month , ≈ 10% in 100 years

Need of standards/references to interpret these numbers

- Perspectives :

High zoom
Correlative Visible / elemental (X-ray) / molecular (Raman) imaging
Application on MATISS2

- Thanks for your attention -

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Surface du verre et interface – Joint Laboratory CNRS/Saint-Gobain

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