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# ANGLE-DEPENDENT DIFFUSION IN 2D DIELECTRIC MONOLAYER SURFACES DISPLAYING CORRELATED DISORDER

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Mona Treguer-Delapierre<sup>1</sup>, Philippe Lalanne<sup>2</sup>, Glenna L. Drisko<sup>1</sup>

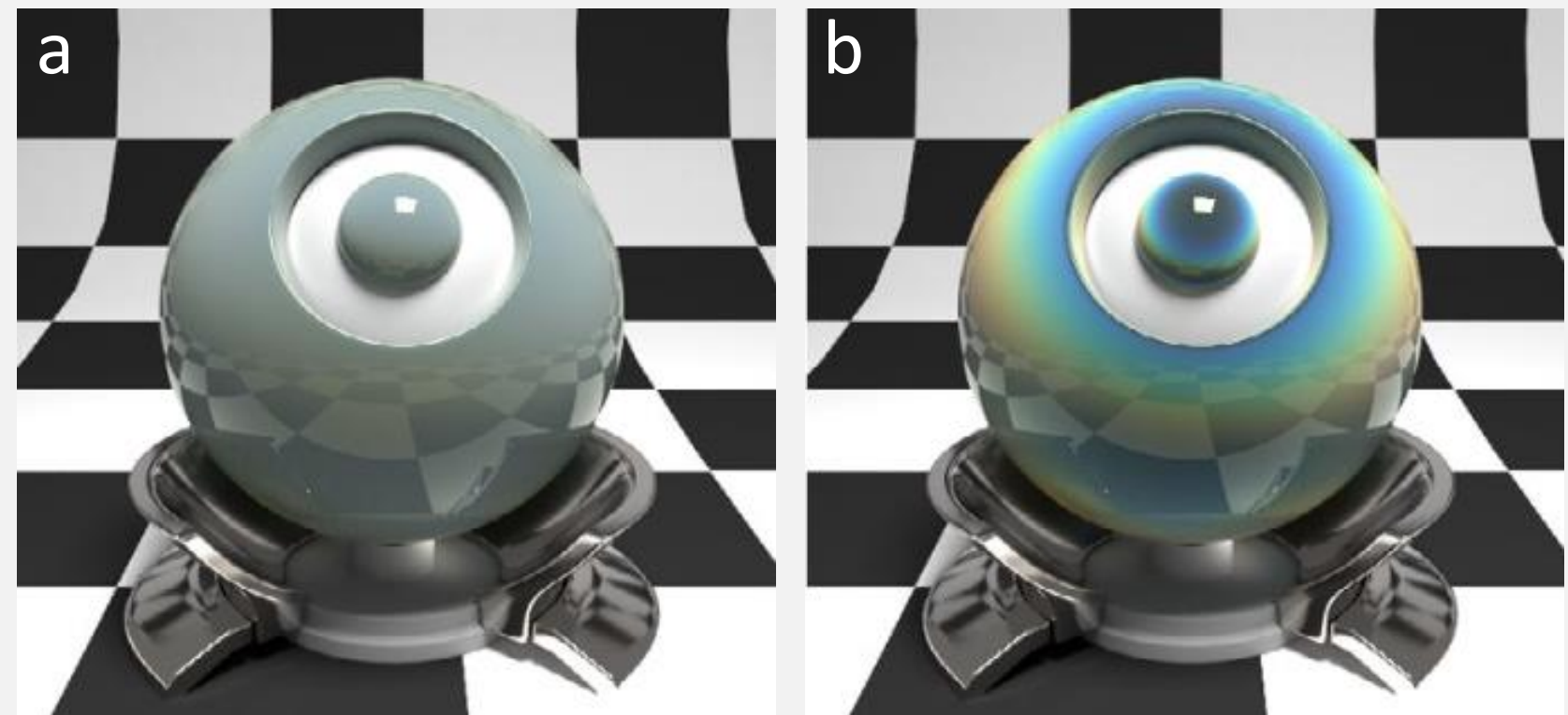
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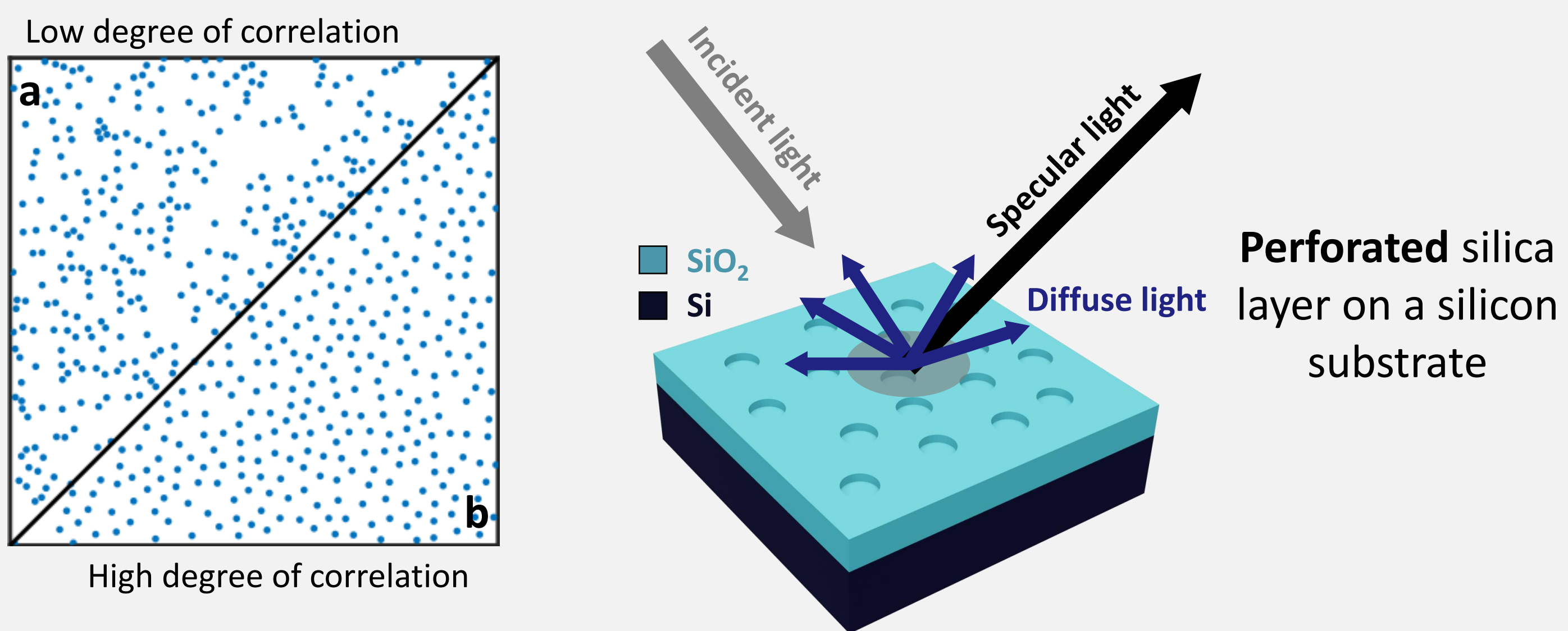
<sup>3</sup> iLM, CNRS, Villeurbanne, France.

## Context

How can appearance be tuned using nanostructured surfaces?

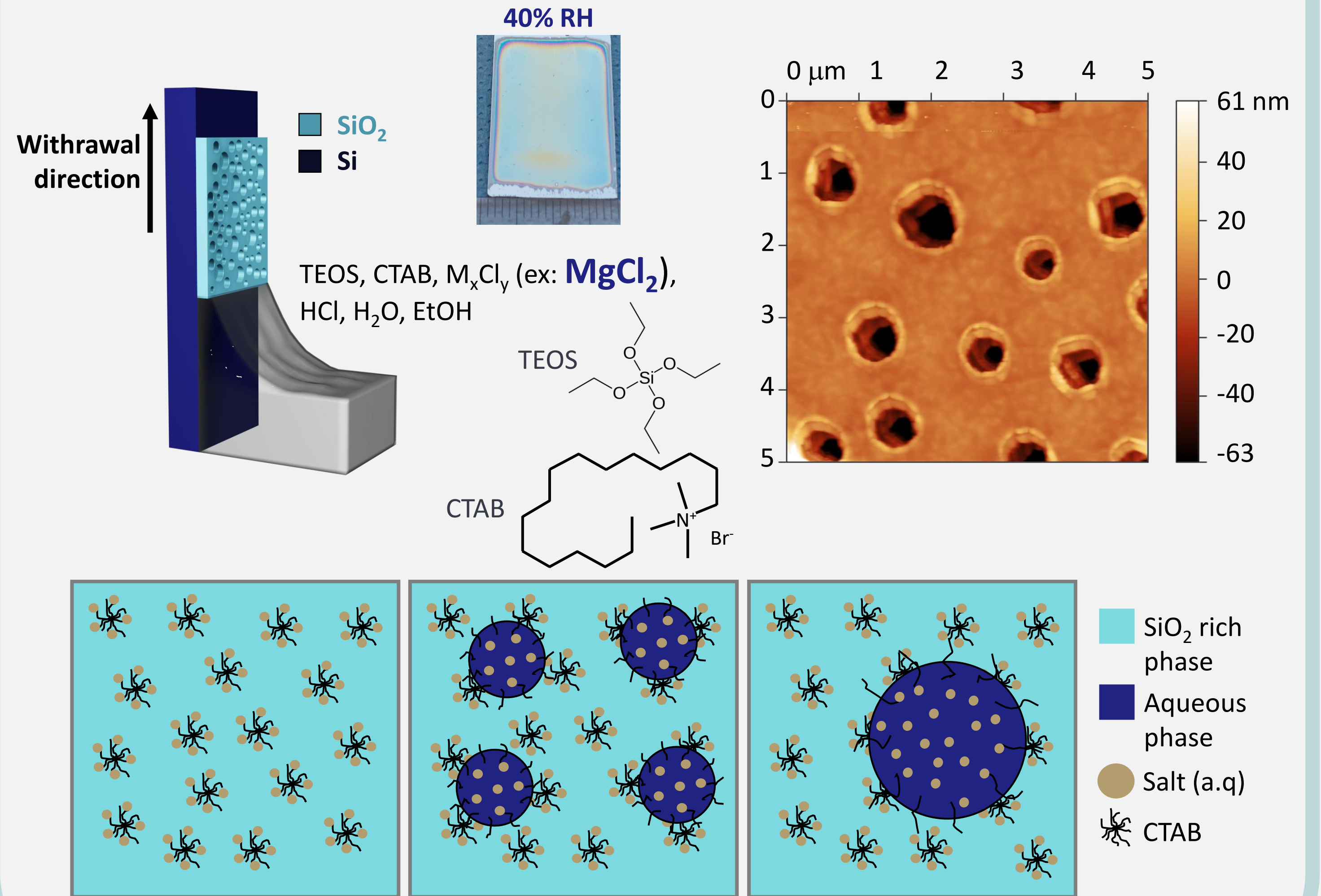


Example of visual effect with Ag NPs on a glass substrate:  
(a) low degree of correlation, (b) high degree of correlation



## Sol-gel fabrication of a macroperforated silica layer

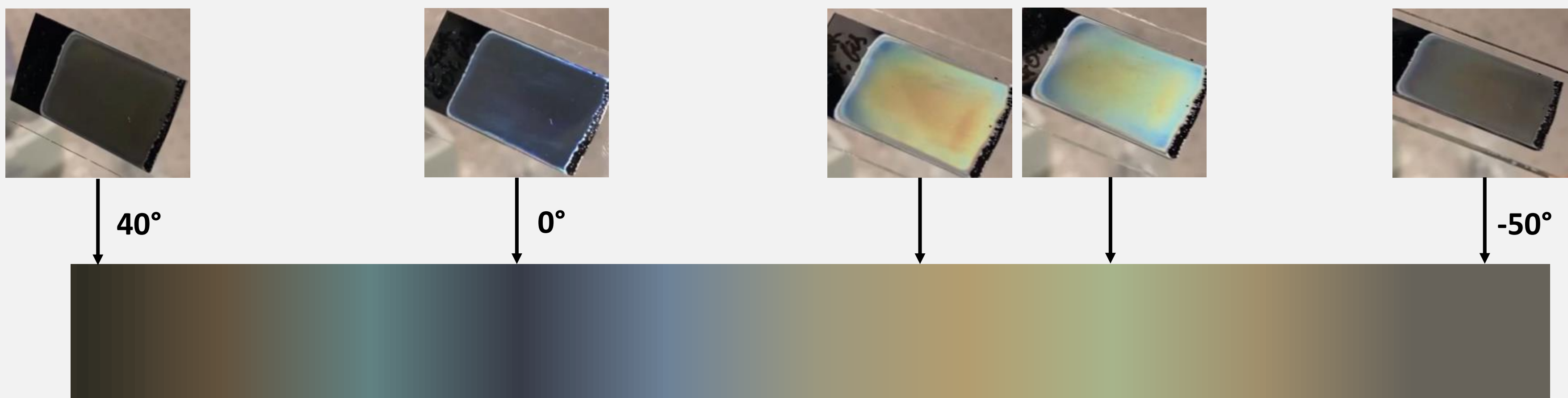
Dip-coater:  $T_{\text{chamber}}$  relative humidity, withdrawal speed



Macropore formation mechanism via salt-induced water adsorption

## Conclusions and perspectives

Specular reflection only

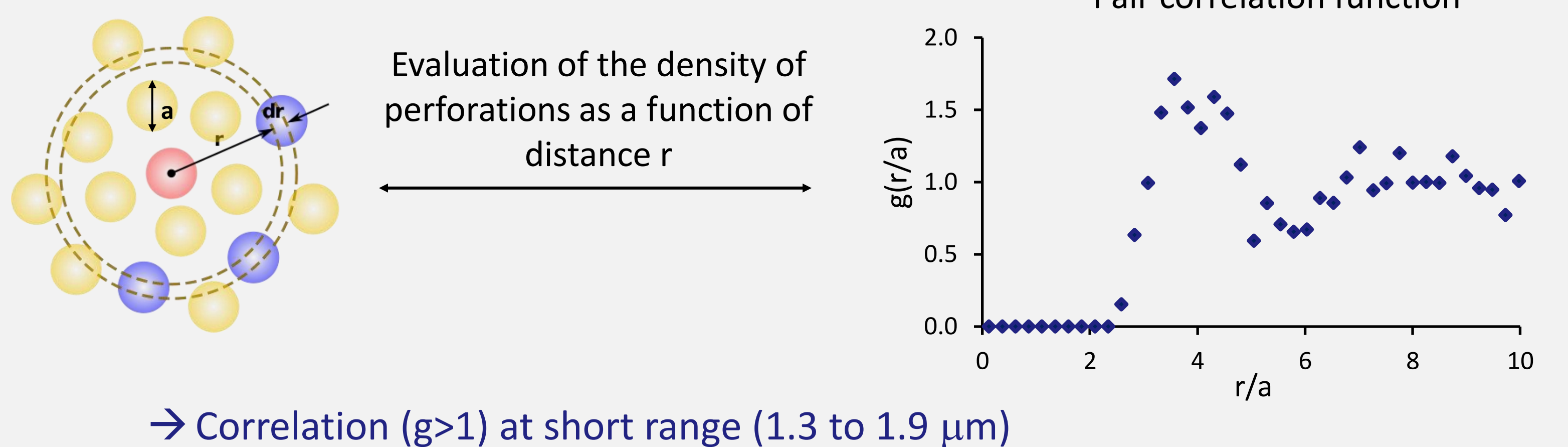
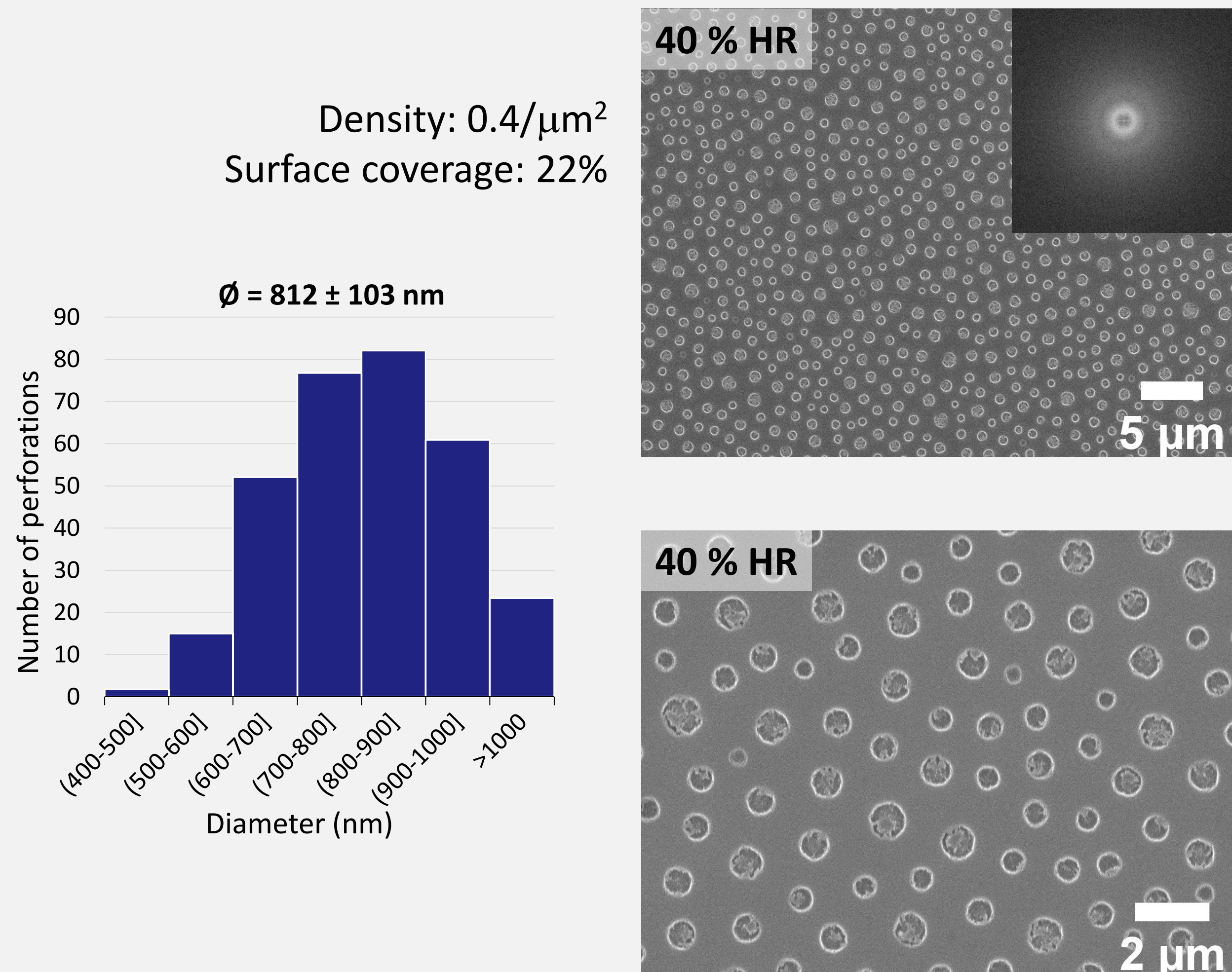


→ Angle-dependent diffusion for a film with short-range correlation

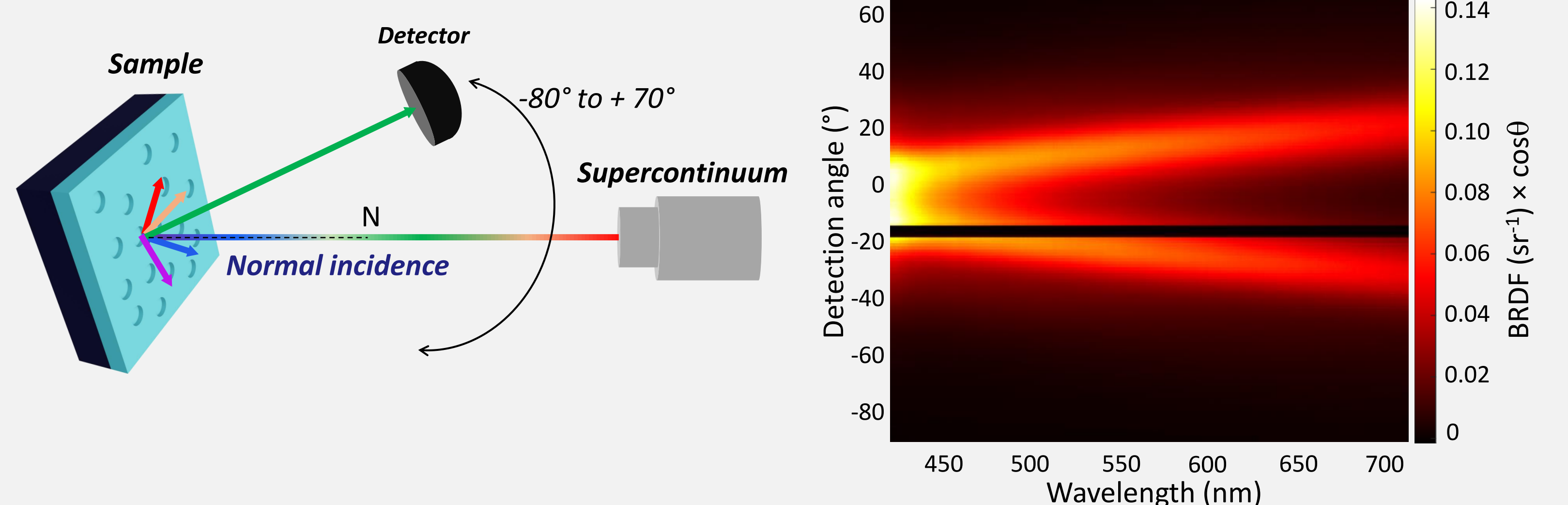
→ Tailored perforation size

→ Fabrication of high density perforated surfaces  
→ Incorporation of pre-formed resonant NPs in perforations

## Impact of structural correlation on the diffuse reflectance of perforated films



→ Correlation ( $g > 1$ ) at short range (1.3 to 1.9  $\mu\text{m}$ )



→ Suppression of the diffuse component near the specular axis ( $0^\circ$ )

[1] K. Vynck et al, *Nat. Mater.*, (2022). <https://doi.org/10.1038/s41563-022-01255-9>

[2] L. Roach et al, *Nanoscale* **14**, 3324 (2022)

[3] G. L. Drisko et al, *Adv. Funct. Mater.* **24**, 5494 (2014)