



HAL
open science

Angle-dependent diffusion in 2D dielectric monolayer surfaces displaying correlated disorder

Julien Castets, Adrian Agreda, Lucien Roach, Adrian Hereu, Kevin Vynck, Mona Tréguer-Delapierre, Philippe Lalanne, Glenna L. Drisko

► **To cite this version:**

Julien Castets, Adrian Agreda, Lucien Roach, Adrian Hereu, Kevin Vynck, et al.. Angle-dependent diffusion in 2D dielectric monolayer surfaces displaying correlated disorder. 13rd Meeting on Nanosciences Advances - MNA 2022, Sep 2022, Porquerolles, France. hal-04616902

HAL Id: hal-04616902

<https://hal.science/hal-04616902>

Submitted on 19 Jun 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

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

Julien Castets¹, Adrian Agreda², Lucien Roach¹, Adrian Hereu¹, Kevin Vynck³,
Mona Treguer-Delapierre¹, Philippe Lalanne², Glenna L. Drisko¹

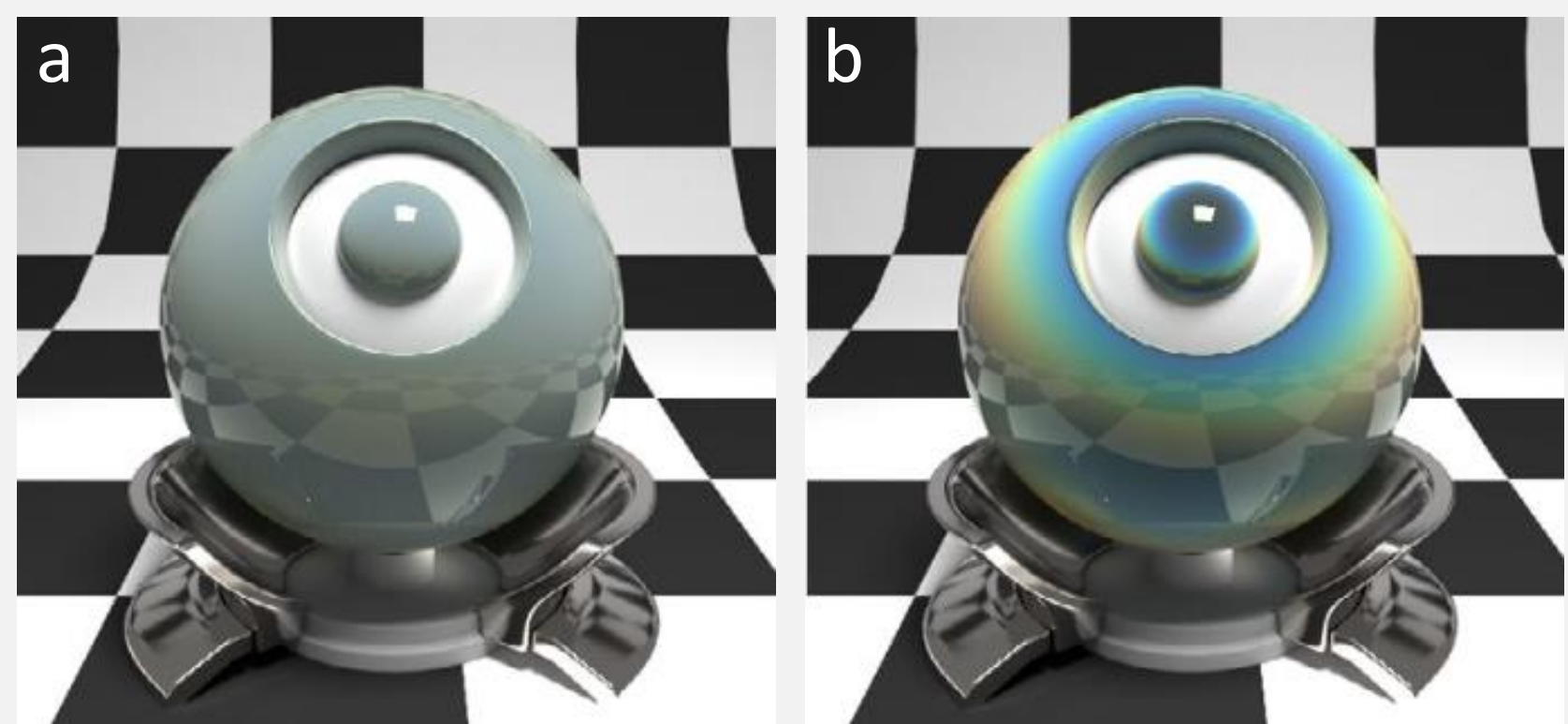
¹ Institut de Chimie de la Matière Condensée de Bordeaux, CNRS, Bordeaux, France

² Laboratoire Photonique Numérique & Nanoscience, CNRS, Bordeaux, France

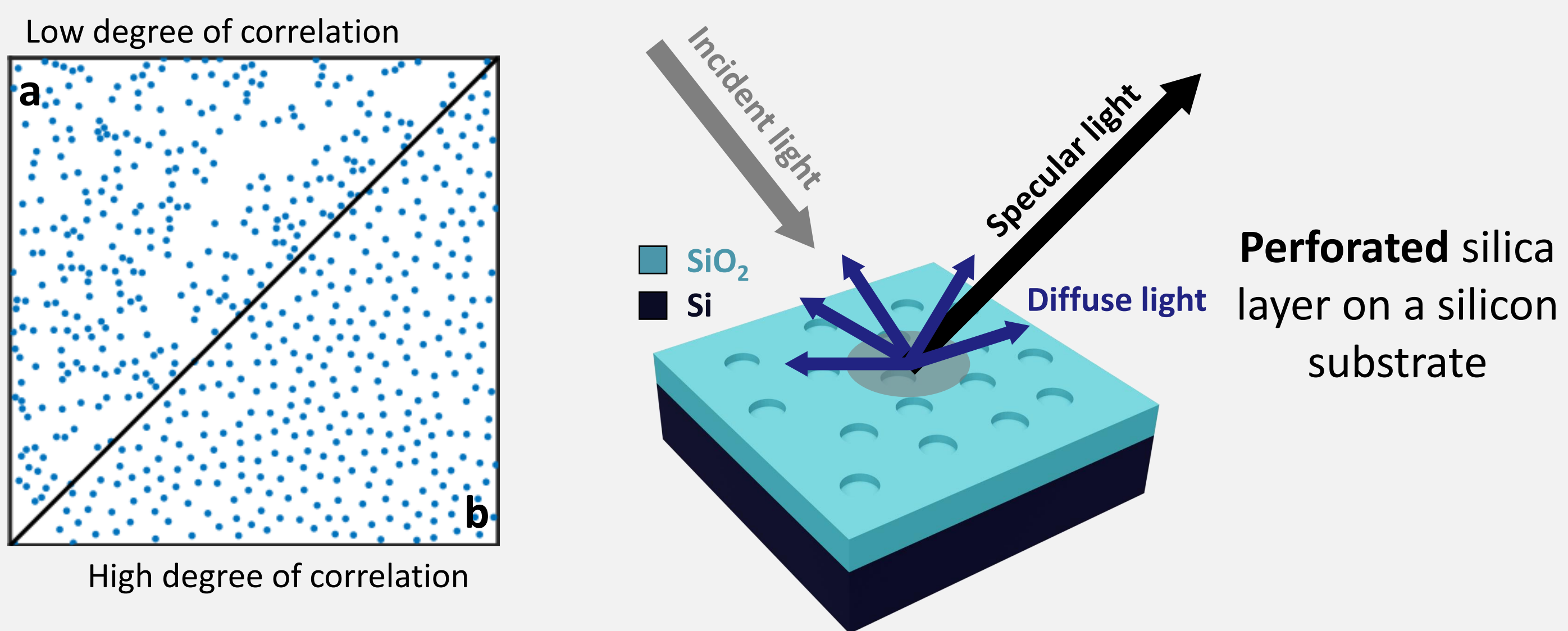
³ iLM, CNRS, Villeurbanne, France.

Context

How can appearance be tuned using nanostructured surfaces?

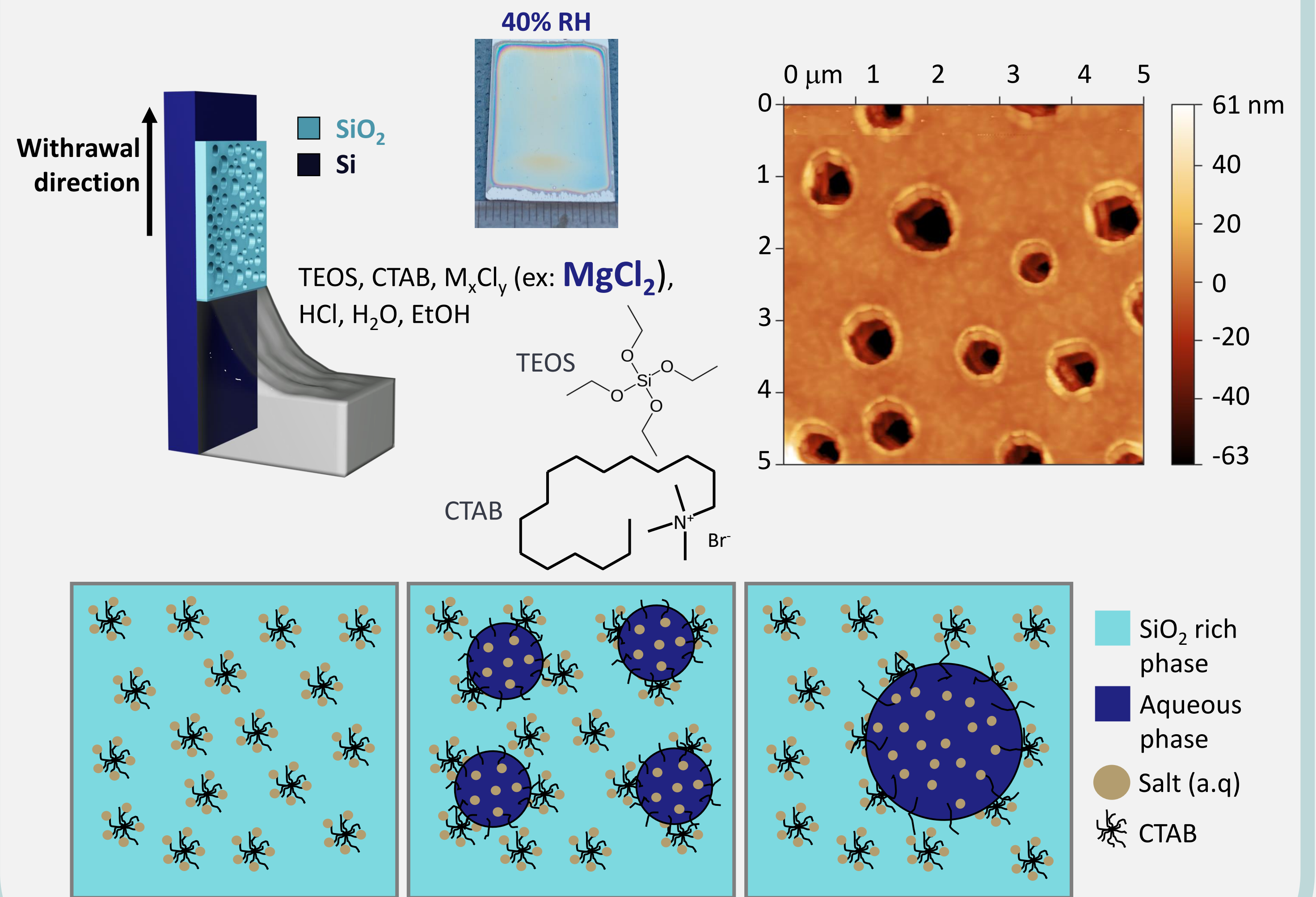


Example of visual effect with Ag NPs on a glass substrate:
(a) low degree of correlation, (b) high degree of correlation



Sol-gel fabrication of a macroperforated silica layer

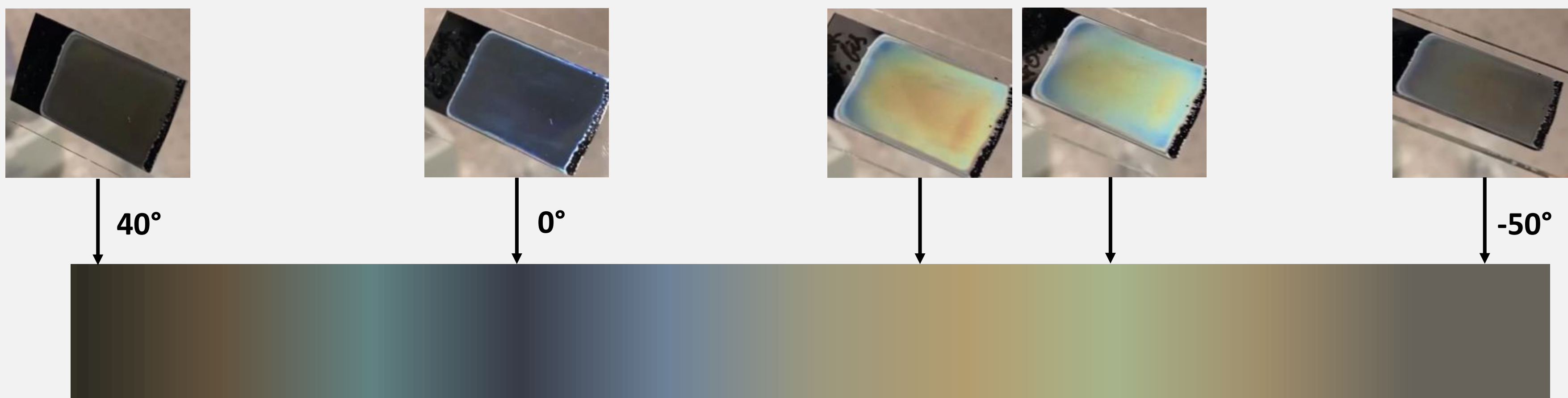
Dip-coater: T_{chamber} relative humidity, withdrawal speed



Macropore formation mechanism via salt-induced water adsorption

Conclusions and perspectives

Specular reflection only



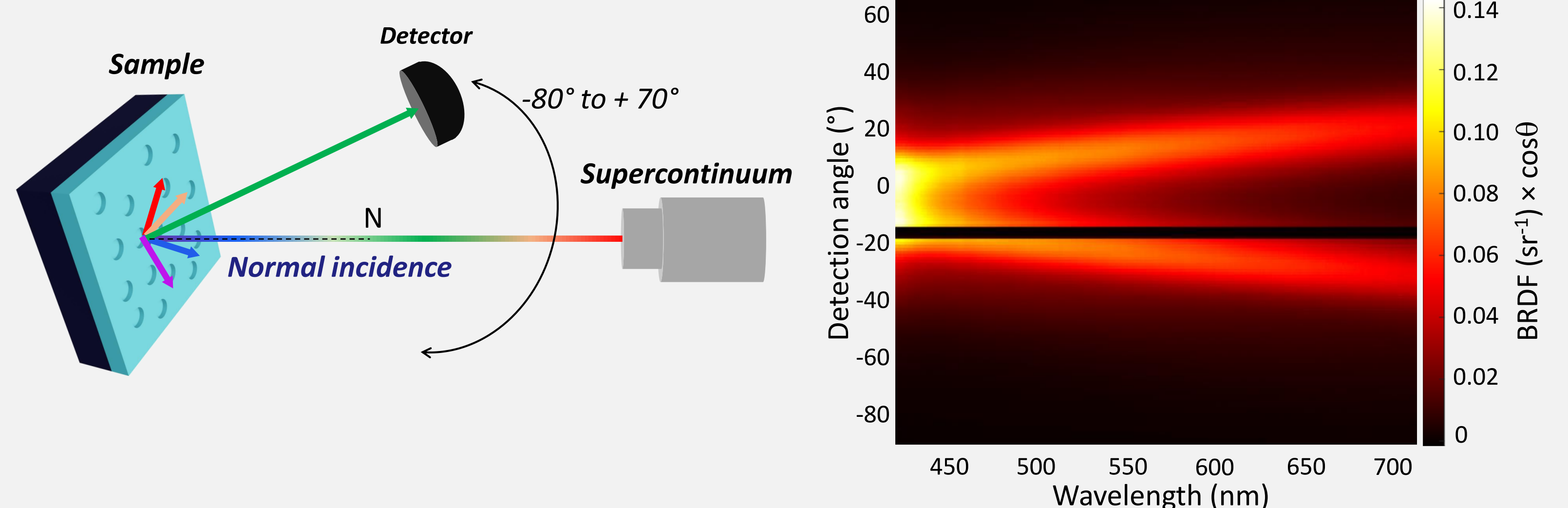
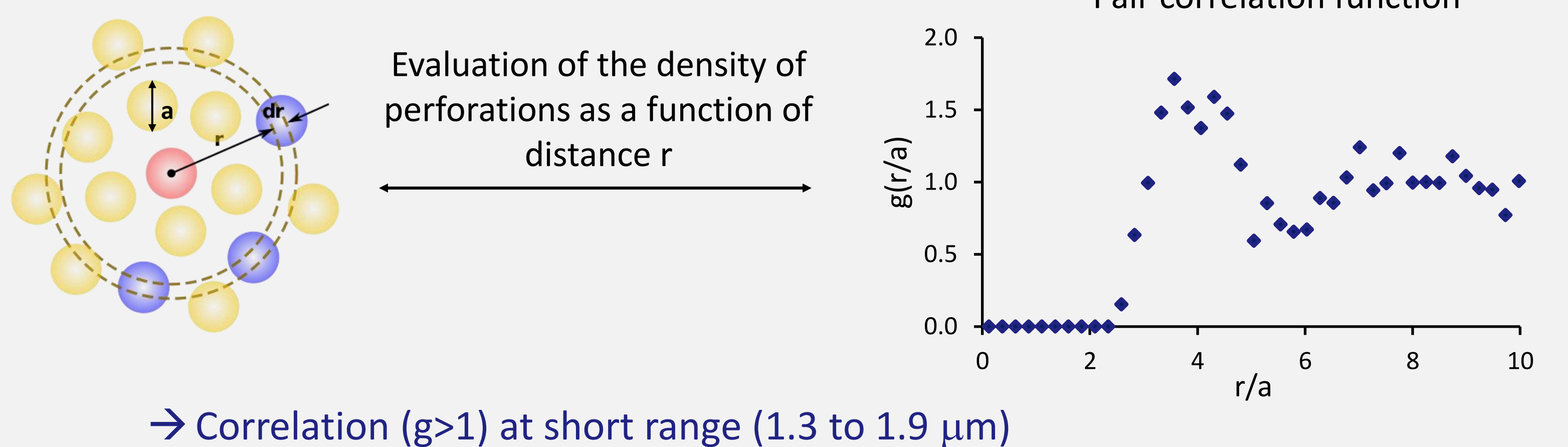
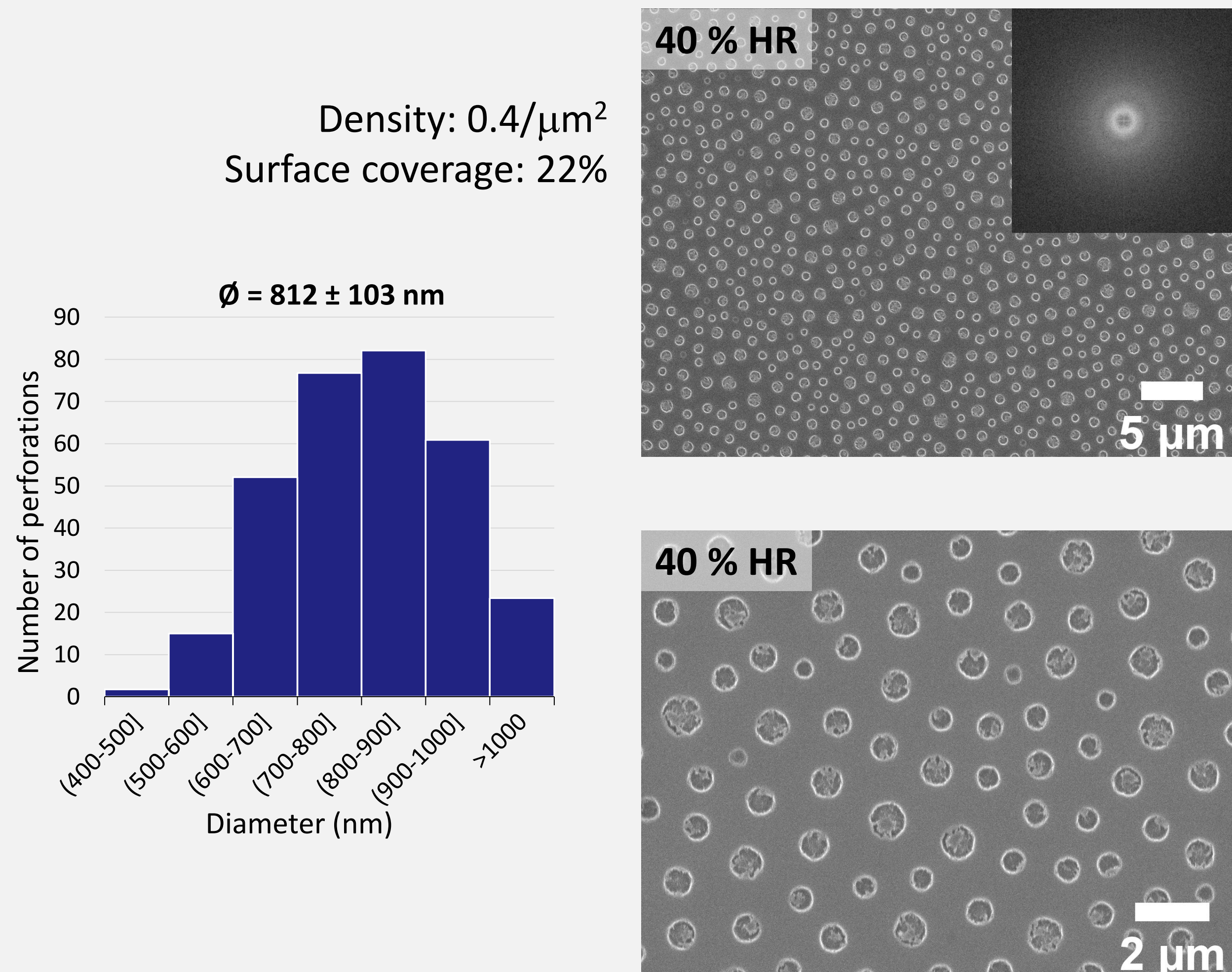
→ Angle-dependent diffusion for a film with short-range correlation

→ 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



→ Suppression of the diffuse component near the specular axis (0°)

[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)