



	Experiment title: Morphology characterization of omniphobic surfaces with X-ray high resolution holographic tomography/laminography	Experiment number: SI-2552
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Report:

In the experiment SI2552, we imaged omniphobic surfaces by X-ray holotomography. The sample dimensions is sketched in Figure 1. We are interested in the interface between porous polymer and the coated oil. We want to see the surface of the coated oil.

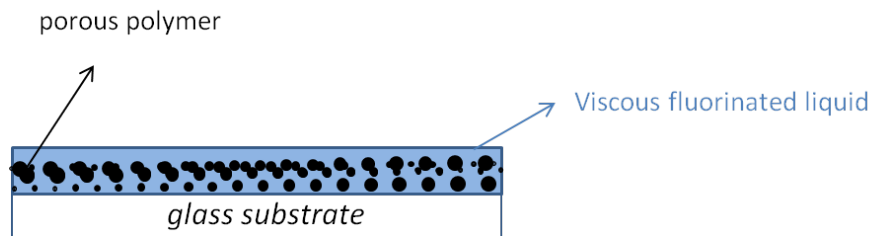


Figure 1. Cross section of the sample.

In order to make the experiment more successful, we prepared several types of samples as listed in Table 1.

Table 1. Sample lists

No.	Description	Environment	substrate
#1	Without coating	water	glass
#2	coated	water	glass
#3	coated	water	pmma
#4	coated	water	pmma
#5	coated	air	pmma
#6	coated	air	glass
#7	coated	air	glass

We first imaged “raw” surface without oil coating. By doing this, we could compare the coated surface and uncoated surface. Considering glass may absorb a lot, we also prepared the same samples on PMMA substrate. Note that #4 is the same configuration to #3 but on different samples, on the purpose of proving the repeatability and reproducibility of our measurements. Samples #7 and #6 are also the same configurations, but we scanned them in different geometries in order to take into account the possible effect of scanning geometries on liquid morphologies. We scanned #7 horizontally as in Figure 1. Results are quite promising, Figure 2 is a rough reconstructed slice on sample #3 without phase retrieval! From the image, we could already resolve the surface of the coating. Later on by performing more sophisticated reconstruction, we could qualify the polymer particle size, coating thickness and so on.

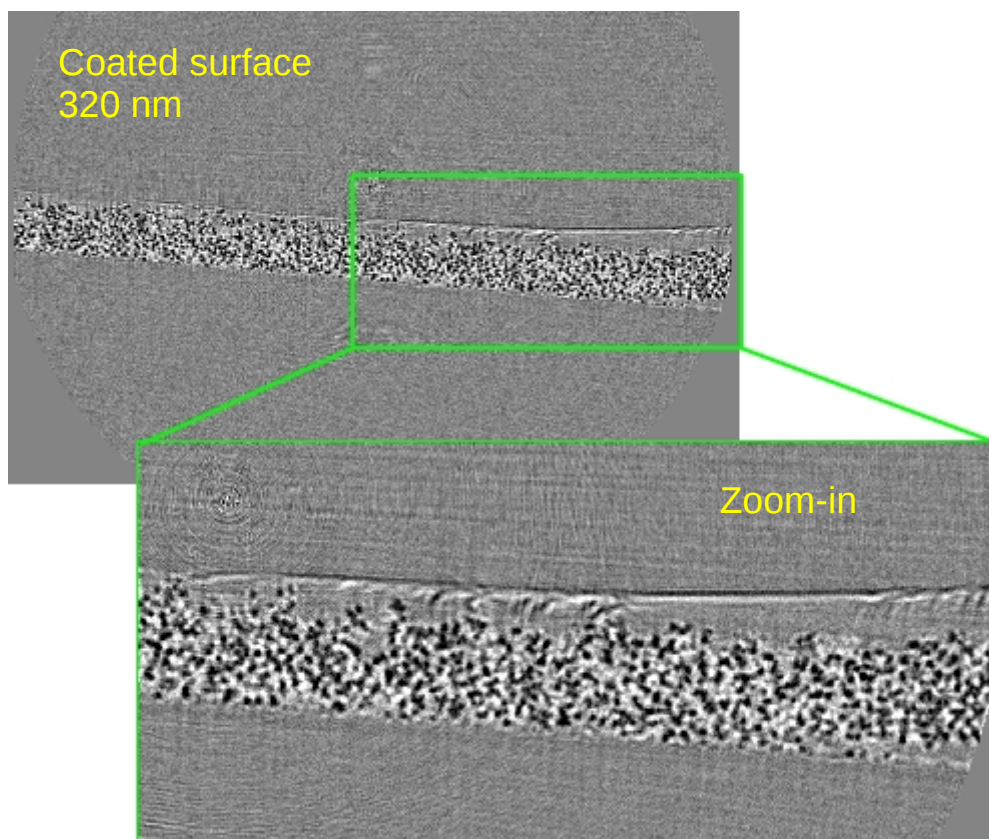


Figure 2. one tomographic reconstructed slice on #3

We are now preparing a manuscript, focusing on following topics. Structure characterization of this new surface using different methods (SEM, X-ray imaging), surface stability testing, examples of this superhydrophobic (SH) surface applied to various waterproof cases.

Besides imaging the surface, another interesting topic of uncoated SH surface has been evaluated as well. We aim to see the morphology of the SH-air-water interface. Below shows a preliminary reconstruction of the surface contact with water. Data are now under processing.

