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PORTFOLIO

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Microscope observation of a droplet surface on a plate by coating of a water-repellent material

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Figure 1 shows a deionised (DI) water droplet of volume $V_B = 30$ μL on a superhydrophobic surface by a spray-coating of HIREC 1450 (NTT Advanced Technology Corporation) whose components are principally fluororesin and two solvents of heptane and toluene. The spray-coating makes irregular rough microstructure of fluororesin powder on a plate surface. Figure 2 shows a photograph of the sprayed surface and the scanned image of the surface roughness by a laser microscope. The maximum height of the fluororesin microstructure was about 20 μm. A droplet surface on the plate by the spray-coating was observed by a stereomicroscope of 100–400 magnifications (see Fig. 3). The left of Fig. 3 shows the virgin droplet surface just after dropping on the plate, and the right of Fig. 3 shows the sessile droplet surface with the fluororesin powder after the droplet rolling on the plate. After rolling, the fluororesin powder which uniformly adhered on the droplet surface ends up descending to an equilibrium level due to the gravity as illustrated in Fig. 4. It would be informative to notice that spray powder adheres to a droplet surface after a certain experiment on the plate by a spray-coating of a water-repellent material.

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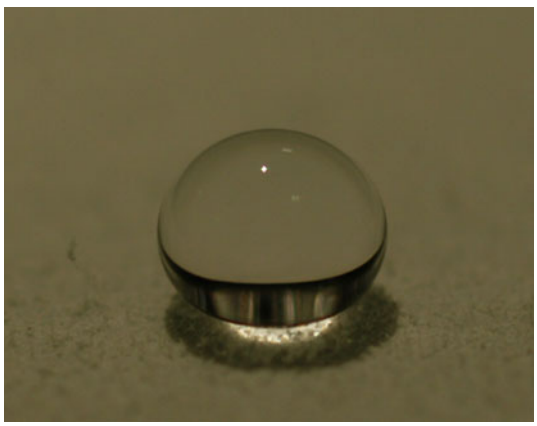

Fig. 1 A droplet of $V_B = 30$ μL fending off a hydrophobic surface

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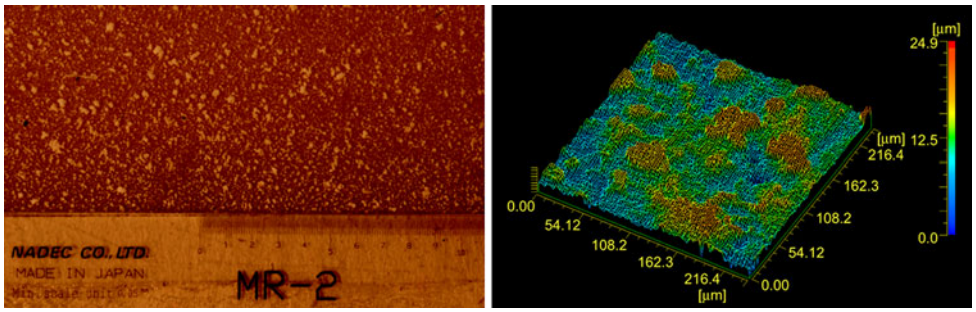

Fig. 2 Surface roughness of a water-repellent coating. *Left* photograph taken with a 35-mm format digital SLR camera. *Right* scanned image of the surface roughness by a laser microscope

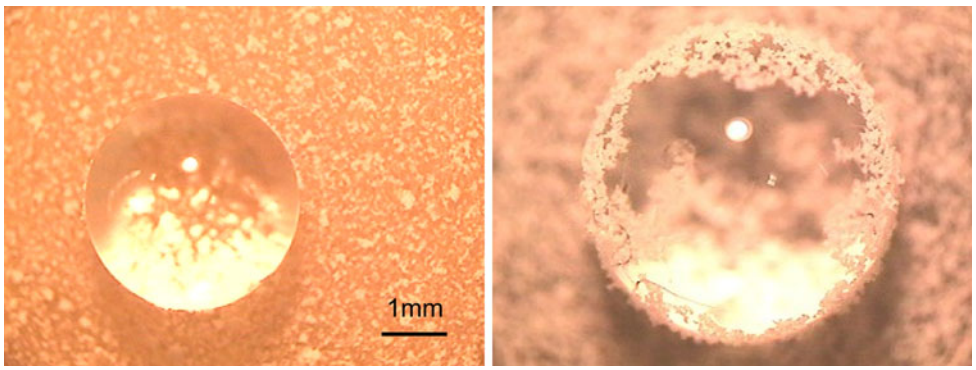

Fig. 3 Stereomicrographs of a droplet surface ($V_B = 30$ μL) on a plate by coating of a water-repellent material. *Left* before rolling, *right* after rolling

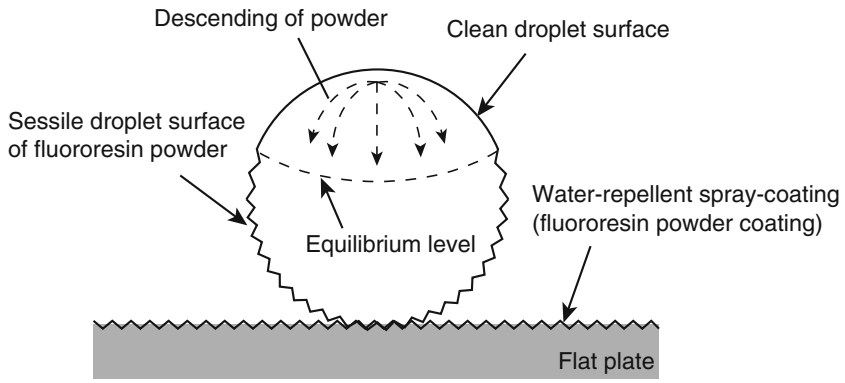

Fig. 4 Sketch of descending powder on a droplet surface