エレクトロスピニングを用いた液体滑液膜の作製と評価

Fabrication and evaluation of slippery liquid-infused porous surface

by electrospinning method

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In nature, various plants and insects have functional wettability. In particular, lotus leaves are well known for their super-hydrophobic property, which is called "lotus effect". This property enables applications for droplet-repellency and self-cleaning. Recently slippery-liquid-infused-porus-surface, which has extremely repellent property, was reported [1]. With this surface, we can repel low-surface-tension droplet at much low sliding angle, which was unable for past hydrophobic surfaces. For application, simple, cost-effective and scalable method of fabricating this surface is desired.

In this study, we fabricated thin film with PVDF-HFP polymer, which have hydrophobicity, chemical inertness, high thermal stability, and mechanical strength. We used elecrospinning method, which is simple, cost-effective, and scalable. Figure.1 shows the surface laser microscope image of PVDF-HFP fiber film. We can understand that micro fibers are fabricated and construct microstructure. This single PVDF-HFP film has high adhesion to water droplets and the droplets stick to the film. Therefore, we infused lubricants into the film to decrease the pinning forces, which enabled the film to achieve high repellency. Figure.2 shows the surface roughness of PVDF-HFP aligned fiber film. The RMS of the film was $3.0 \pm 1.2 \mu m$ and the capillary force which retain lubricant would work.

Other evaluation, such as heat transfer property and mechanical stability, is investigated.



Figure.1 Surface laser microscope image of PVDF-HFP fiber film



Figure.2 Surface roughness of PVDF-HFP aligned fiber film

References

[1] Tak-Sing Wong, NATURE., 477, 443 (2011)

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