

Preparation of Superhydrophobic Pipe for Drag Reduction

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Abstract

Superhydrophobic surface reduce frictional drag of water flow by supporting a shear-free air-water interfaces on the micro- or nanostructure [1]. Because liquids are transported through a pipeline in most industrial site, it is necessary to fabricate the superhydrophobic pipe for drag and power reduction. Although various fabrication methods of superhydrophobic surface have been reported, these methods have limitations of material and surface geometry. In this research, we demonstrated fabrication method of superhydrophobic pipe with a nanostructure of pipe inner surface. Polyaniline(PANI) nanofibers with a size of ~50 nm were evenly coated on inner wall of plastic pipe using dilute chemical polymerization method [2]. After that, Teflon was coated on the mesh surface to modify with the low surface energy by dip coating. The superhydrophobic pipe had a high static water contact angle, low sliding angle and low frictional drag.

References

[1] Jonathan P. Rothstein, Annu. Rev., 42 (2010) 89-109

[2] Taechang An, Seong J. Cho, WooSeok Choi, Jin Ho Kim, Soo Taek Lim and Geunbae Lim, Soft Matter, 7 (2011) 9867-9870

Figures

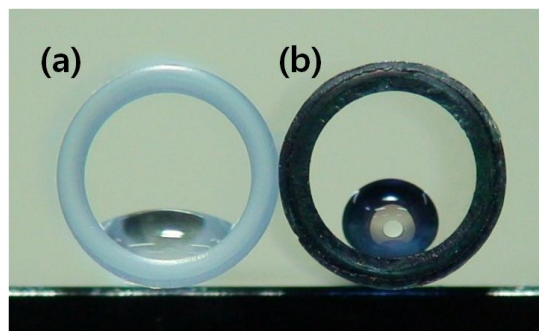


Figure 1. Static water contact angle of (a) bear plastic pipe and (b) superhydrophobic pipe.

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