Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Efficient and sustainable drag reduction surface of marine algae Miyeok (Undaria pinnatifida)[1] GUN YOUNG YOON, SANG JOON LEE, Pohang University of Science and Technology — Miyeok has a slippery surface in which mucilage works as a lubricant. In this study, the drag reduction effect of the mucilage covered surface of Miyeok was investigated as a liquid-infused surface (LIS). The morphological structures of Miyeok and its mucilage-secreting glands were observed by using a scanning electronic microscopy and a transmission electron microscopy. As a result, Miyeok skin surface has wrinkled structures and the mucilage glands have re-entrant configuration. Velocity profiles of the boundary layer flow over Miyeok samples were measured by using a particle image velocimetry and particle tracking velocimetry techniques to evaluate the slip length. Pressure drop and skin friction effects were measured to estimate the slip effect and the corresponding drag reduction rate. The Miyeok surfaces tested in this study were found to have a slip length of 101μm and the pressure drop was 26% reduced due to the morphological characteristics and slippery mucilage. With these effects, the mucilage surface exhibits skin friction reduction up to 35%. The present results would be helpful for understanding the drag reduction mechanism of Miyeok and developing a bioinspired LIS.

[1]National Research Foundation of Korea [NRF-2017R1A2B3005415]

Sang Joon Lee
Pohang University of Science and Technology

Date submitted: 31 Jul 2019 Electronic form version 1.4