Identifying the colloidal fouling behavior on the sharkskin-mimetic surface: In-situ monitoring and lattice Boltzmann simulation

유철훈, 이종석†
서강대학교
(jongslee@sogang.ac.kr†)

Sharkskin-mimetic (Sharklet) patterning has proven effective to enhance the fouling resistance of the surface. Herein, we systematically investigated the colloidal fouling behavior on the Sharklet-patterned polyurethane (PUA) surfaces with different pattern spacings (1.5, 2 and 6 μm) by performing both in-situ monitoring and lattice Boltzmann (LB) simulations. Our careful in-situ monitoring of the movement of polystyrene model foulant particles (0.9 μm diameter) revealed that varying the pattern spacing differentiated both the degree and local distribution of colloidal fouling on the Sharklet-patterned surface. Interestingly, the LB simulation enabled the qualitative tracking of individual foulants on the Sharklet-patterned surface, which was consistent with the experimental observations. It suggested that the distribution of the deposited foulants is strongly related to the magnitude and direction of the local hydrodynamic force exerted on the foulants. Our proposed synergistic approach provides a new platform for the evaluation of the fouling behavior on patterned surfaces.