Effect of superhydrophobic surfaces on the flow over a hydrofoil at low Reynolds number\textsuperscript{1} HYUNSEOK KIM, NAYOUNG KIM, HYUNGMIN PARK, Seoul National University — In the present study, we experimentally investigate the effect of superhydrophobic surface on the flow over a hydrofoil at low $Re_c < 10^4$, where $c$ is the chord length of a hydrofoil. As a hydrofoil, we consider the cross-sections typically used for airfoils like NACA0012, NACA0024, and NACA4412, which stand for thin, thick and cambered hydrofoils, respectively. Spray-coating of hydrophobic nanoparticles are applied onto the hydrofoil surface and subsequent velocity fields are measured in a water tunnel using two-dimensional particle image velocimetry at different angles of attack, $\alpha = 0^\circ - 20^\circ$. At small $\alpha$’s (for example, less than $10^\circ$), it is found that the surface slip tends to affect the flow separation slightly and also modify the size of recirculation region in the wake. Since a massive separation occurs at the leading edge at larger $\alpha$’s, however, the effect of superhydrophobic surface becomes diminished. In the talk, the dependence of the hydrodynamic role of surface slip on the hydrofoil shape and $Re_c$ will be presented.

\textsuperscript{1}Supported by the NRF programs (NRF-2012M2A8A4055647, NRF-2013R1A1A1008373) of Korean government.