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Modulation of the streaming potential and slip characteristics in electrolyte flow over liquid filled surfaces[1] BEI FAN, PRABHAKAR BANDARU, University of California San Diego — A significant enhancement in the streaming potential (Vs) was obtained in experiments considering the flow of electrolyte over liquid-filled surfaces (LFSs), where the grooves in patterned substrates are filled with electrolyte immiscible oils. Such LFSs yield larger Vs (by a factor of 1.5) compared to superhydrophobic surfaces, with air-filled grooves, and offer tunability of electrokinetic flow. Through changing the filling oils, it is shown that the density, viscosity, conductivity, surface tension as well as the dielectric constant of the filling oil in the LFS, determine Vs. Considering the concentration polarization phenomenon for nonhomogeneous charged LFS, the hydrodynamic slip length is inversely proportional to the dielectric constant of the filled oil. Relating the hydrodynamic slip length to the obtained Vs offers insight into flow characteristics, as modulated by the liquid-liquid interfaces in the LFS.

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