

Electrical double layer distribution of asymmetric sizes and valences of ions between slit electrodes

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In order to enhance the efficiency of supercapacitors and batteries, we need to understand electric double layer (EDL) near electrodes. The EDL structure is expected to depend on the sizes and valences of accompanying ions. Previous research have formulated the equilibrium distribution of EDL near single electrode. However, practical electrical devices utilizes two electrodes where electrolyte is confined inside. In this work, we study the EDL structure of ions of which sizes and valences are asymmetric using the continuum approach. Firstly, we propose the asymmetric ion distribution as a function of electrical potential. Secondly, the dynamics of asymmetric ions for confined slit is studied and compared with equilibrium solution. Finally, the effect of Stern layer boundary condition is considered for practically predicting the EDL of both electrodes.