

Title: Correlation between ion concentration evolution and synaptic behaviors in electrolyte-gated transistors

Abstract: Synaptic electronics has been proposed to emulate the connection between the neurons in the human brain. Physically understanding of such device is still in urgent need for the further design and optimization of artificial synapse. In this talk, correlation between ion concentration and synaptic behaviors emulated by electric-double-layer transistors will be numerically investigated.

Synaptic behaviors are mimicked based on such device with single- or dual-gated architecture, such as excitatory postsynaptic current (EPSC), paired-pulse facilitation (PPF) and spatiotemporal information processing. A quasi-static scenario is found to capture the channel electron transport in the protonation/deprotonation processes of solid electrolyte. This finding may expand our physical understanding of synaptic transistor for the further design and optimization. In addition, device reliability of synaptic function on the ion concentration of solid electrolyte is tentatively proposed and remains to be examined.