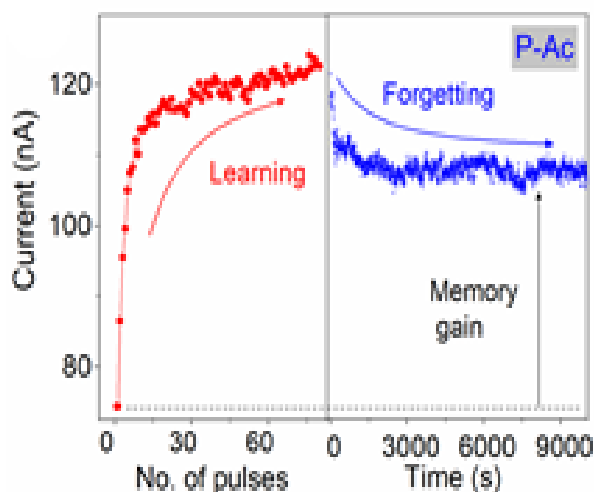
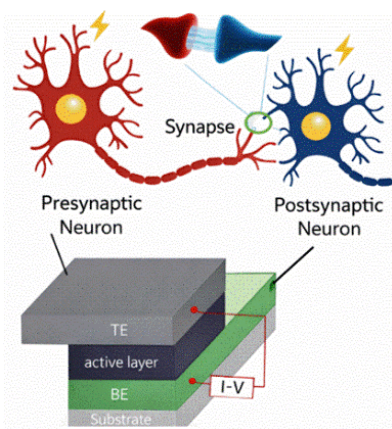


Organic electronic memory: from bistable memory devices to memristors and artificial neurosynapses.

Jiří Pflieger

Institute of Macromolecular Chemistry ASCR

Memristor is a two-terminal electronic element that exhibits non-linear current-voltage characteristics and hysteresis during cycling. Its resistance depends on the amount of charge that has previously passed through it. Its ability of obtaining multimodal resistance states depending on electrical external stimuli is analogous to the response of neuronal synapses and can be used in artificial neural networks and neuromorphic computing. Memristors with neurosynaptic functionality have a continuum of resistance values with synaptic weights modulated by the number, amplitude and frequency of applied voltage pulses. Organic materials, and polymers in particular, have properties of “soft matter”, which contains flexible molecular groups and can change resistance when stimulated by applied voltage. There are ideal candidates for memristors to mimic biological neuronal synapses.



Mimicking learning and forgetting behavior of the polymer memristor during repeated stimulation, and subsequent memory retention. Conductance recorded during the stimulation with 80 identical trigger pulses (+1.1 V, 20 ms). The ability of the devices to retain the increased conductance was monitored during relaxation (forgetting) using low-amplitude pulses.