

Method for reversible and bistable switching of current in electron field emission (Technion)**code:** CHM-1407

Innovative memory switch devices require reliable bistable conductance properties. It would be desirable if such bistable characteristics were available in robust solid state materials such as diamond, benefiting from outstanding physical properties. Here we report on a bistable current with reversible switching effect from surface transfer doped ultrananocrystalline diamond thin films measured by electron field emission. This switching is manifested by the appearance of huge jumps in the current emission, up to 4 orders of magnitude, occurring at specific extracting electric field values. Persistent hysteresis is exhibited whenever the field is ramped down. We propose that these phenomena are the result of resonant-tunneling through a double barrier junction composed of ta-C-/ Nano Diamond-/ adsorbent-/ vacuum. This finding shows the first electron source material having ultrafast switching with memory effect; this may use for the realization of novel kinds of memory switch devices with unprecedented performance or electron sources with high resolution and fast response.

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