Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Multifunctional Memprocessor Device with DNA-Guided Nickel Ions Chain[1] CHIA-CHING CHANG, Department of Biological Science and Technology, National Chiao Tung University, WEN-BIN JIAN, YU-CHANG CHEN, Department of Electrophysics, National Chiao Tung University, YUN-LIANG SOO, Department of Physics, National Tsing Hua University, CHIUN-JYE YUAN, Department of Biological Science and Technology, National Chiao Tung University, MASSIMILIANO DI VENTRA, Department of Physics, University of California, San Diego — Molecular metal ion wires are highly desirable for their potential applications in the field of molecular electronics. However, synthesis of a scaffold-free and long metal chain is exceptional challenging. DNA is a self-assembly wire that chelates metal ions with its base-pairs. By using DNA as template, an 830-nm equivalent conducting nickel ion chain was fabricated. This nickel ion chain device demonstrates the functionality of memristor (memory resistor), memcapacitor (memory capacitor), and redox-induced hysteresis effects. The memory state operation is attributed to the dynamic response of nickel-ion states caused by redox reaction. The redox state of Ni ions is controllable by external bias, making it a multi-state memory component for a possible memcomputer, namely a computer that uses memory to store and process information simultaneously [1]. Ref: [1] M. Di Ventra and Y.V. Pershin, Nature Physics, 9, 200 (2013).

[1]Research is supported by MOST 104-2627-M-009-007 Taiwan and is partially supported by CMRR.

Chia-Ching Chang
Department of Biological Science and Technology, National Chiao Tung University

Date submitted: 03 Nov 2015 Electronic form version 1.4