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Single Nanometric Memory Unit Based On a Protein-Nanoparticle Hybrid IZHAR MEDALSY, Physical Chemistry department, The Hebrew University, Jerusalem, 91904, Israel, ARNON HEYMAN, ODED SHOSEYOV, The Faculty of Agriculture, The Hebrew University, Rehovot 76100, Israel, DANNY PORATH, Physical Chemistry department, The Hebrew University, Jerusalem, 91904, Israel — Proteins as an isolating template and nanoparticle (NP) as an electric storage component can form a single addressable unit cell isolated from the conductive surface and adjacent NPs. This setup gives rise to a wide range of nanoelectronic applications. Here we demonstrate, by Conductive AFM, a single nanometric memory unit using individual protein-NP hybrids. SP1 is a boiling-stable ring-shaped protein, 11 nm in diameter. Mutants of SP1 were synthesized allowing its selective attachment to gold surface and the formation of 2D arrays using methods such as phospholipids trough and Langmuir Blodgett. The SP1 inner pore was connected to Si NP forming a chargeable entity embedded in an isolating unit over a conductive surface. Each NP holds three charging states: natural, positive and negative. The charging life times are 10 min in ambient and days in vacuum. Using this setup, and the relative long charging time, we were able to apply a read and write operations on individual 5nm Si NP embedded in a stable protein.

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