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Memory Nanodevice Based on Zn-MOF-74:

A Molecular Dynamics Study

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Abstract:

A two-level system based on C_{60}^-@Zn-MOF-74 is investigated by molecular dynamics simulation to explore an application as memory nanodevice. An external electric field triggers the displacement of C_{60}^- and defines the status of the system: bit 1 or 0.

The crystal structure of Zn-MOF-74 allows to achieve the high memory elements density and high switching speed. Zn-MOF-74 has one dimensional well-defined pores, which size is big enough to contain the C_{60} ion. There are two groups of electrodes, presented by (6,6) nanotubes. The structure of the system is shown in Figure 1.

The nanodevice has outstanding data **throughput rate about 27 Gbyte/s** and **high memory elements density - 106 Tb/inch^2** [1].

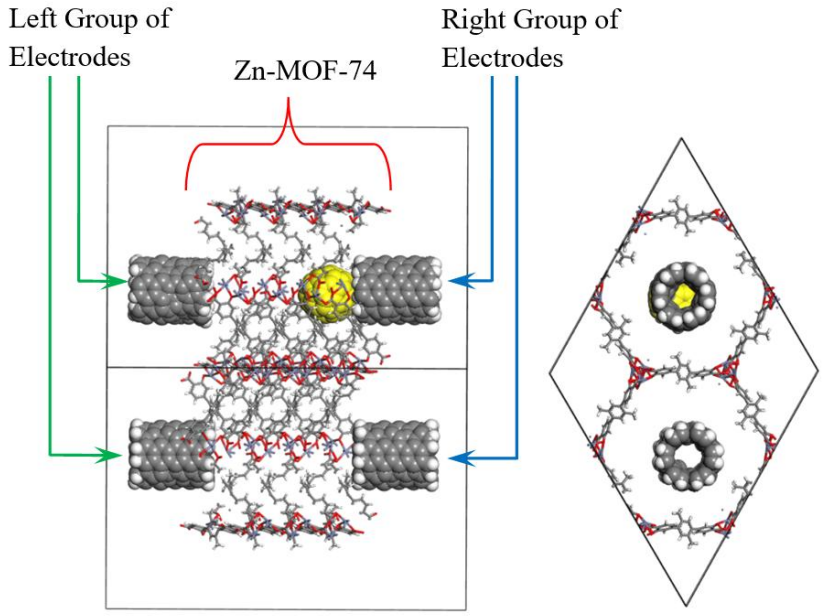

Figure. 1. Element of memory nanodevice, which consists of C_{60} ion (highlighted by yellow), which is enclosed in channel of Zn-MOF-74 with left and right groups of electrodes - carbon nanotubes (6,6).

References:

1. **Suyetin, M.**, Heine, T. *Memory Nanodevice Based on Zn-MOF-74: A Molecular Dynamics Study.* **Journal of Materials Chemistry C**. 2020, 8, 1567-1570. DOI: 10.1039/c9tc05915fs