



Functional Materials Processing for Switchable Device Modulation

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4 - Photo-induced switching operations of DNA biopolymer devices

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Abstract

DNA-based biopolymers have gained significant importance owing to their intriguing properties. Their usage in bioelectronic devices has been actively explored for the past several years. The availability of DNA by natural means followed by its electronic properties in addition to the capability of data storage and ease of processing it has been used in switching memory device applications. Hence, in this chapter we present a detailed discussion of DNA-based biopolymers in memory device applications by focusing on their photo-induced switching behavior. In the process, we discuss the synthesis of DNA biopolymers by means of natural and artificial routes followed by highlighting challenges that include thin film formation, electronic behavior, and the effect of nanoparticle doping on the performance of nonvolatile memory properties. A detailed discussion on photon irradiation and the effect on I-V responses was also presented along with switching behaviors such as the write once, read many times (WORM) response; the write-read-erase memory (WREM) nature, single state with high resistance; and single state with low resistance. With a summary of findings, we present a future outlook on the potential applications of DNA biopolymers in switchable memory devices.

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Keywords

DNA; Biopolymer; Switching; Rewritable; Surfactant; CTMA

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