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Development of indigo-based nonvolatile write-once-read-many-times memory device

Zhengjun Wang^{1,a)}, Konstantinos Sierros², Mohindar S. Seehra¹, Dimitris Korakakis³

¹*Department of Physics & Astronomy*, ²*Department of Mechanical & Aerospace Engineering*, ³*Lane Department of Computer Science & Electrical Engineering*, West Virginia University, Morgantown, WV 26506, USA.

^{a)} Email: zwang3@mix.wvu.edu.

Abstract: The development of a nonvolatile organic write-once-read-many-times (WORM) memory device, consisting of a 100 nm layer of indigo sandwiched between indium tin oxide cathode and Al anode, is reported. This device is found to be at its ON state and can be switched to the OFF state by applying a positive bias with the ON/OFF current ratio being up to 10^6 . The device exhibits storage stability of over 108 h in air without encapsulation. This device offers the possibility of a low-cost biodegradable data storage as Indigo is inexpensive, bio-degradable and non-toxic. The operational mechanism of the device is discussed in terms of dipoles induced at the Al-indigo interface.

Keywords: organic memory device, indigo, organic/metal interface, biodegradable, organic, semiconductors

1. Introduction

There have been a number of recent reports on memory devices based on organic materials with their potential for low-cost, low-power operation and capacity for large data storage¹⁻⁶. Among these is a WORM (Write-once-read-many-times) nonvolatile memory device that stores data permanently and can then be read repeatedly, leading to potential applications in permanent data storage in areas such as personal data depositories, smart

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