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Resistive Switching in Vapor Phase Polymerized Poly (3, 4-ethylenedioxythiophene)

P. Y. Kalode, 성명모

한양대학교 자연과학대학 화학과

We report nonvolatile memory properties of poly (3, 4-ethylenedioxythiophene) (PEDOT) thin films grown by vapor phase polymerization using FeCl₃ as an oxidant. Liquid-bridge-mediated transfer method was employed to remove FeCl₃ for generation of pure PEDOT thin films. From the electrical measurement of memory device, we observed voltage induced bipolar resistive switching behavior with ON/OFF ratio of 10³ and reproducibility of more than 10³ dc sweeping cycles. ON and OFF states were stable up to 10⁴ seconds without significant degradation. Cyclic voltammetry data illustrates resistive switching effect can be attributed to formation and rupture of conducting paths due to oxidation and reduction of PEDOT. The maximum current before reset process was found to be increase linearly with increase in compliance current applied during set process.

Keywords: Resistive switching, vapor phase polymerization, liquid bridge-mediated transfer, PEDOT