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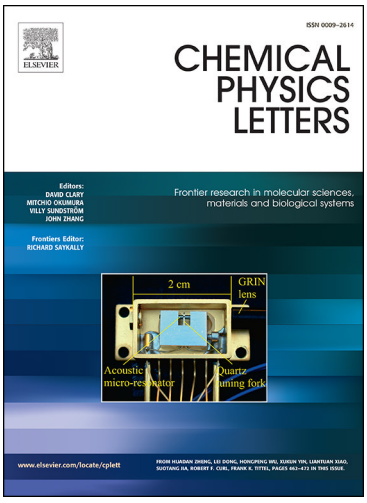

Research paper

In-situ formation of polymer stabilized copper nanoparticles: A hybrid system with non-volatile switchable resistive property

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In-situ formation of polymer stabilized copper nanoparticles: A hybrid system with non-volatile switchable resistive property

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Graphical abstract

Highlights

1. Synthesis of a metal-polymer hybrid system using an *in-situ* method,
2. The system exhibited a bipolar, nonvolatile resistive behaviour,
3. The device shows a constant ON-OFF current ratio with a value of 2×10^3,
4. The device exhibited two different conduction mechanism (ohmic and Poole-Frankle).

Abstract

In this report, we discuss about the preparation of a metal-polymer hybrid system (poly-aminosalicylic acid encapsulated copper nanoparticles) using an *in-situ* method, where the copper sulphate and aminosalicylic acid were used as the precursors for the metal and the polymer, respectively. The composite system was used as an active material for a device to demonstrate the electrical property. The system exhibited a nonvolatile switchable resistive behaviour with a constant ON-OFF current ratio of 2×10^3. The current-voltage behaviour of the metal-polymer based device was followed by the Poole-Frenkel emission and ohmic conduction mechanism.

Introduction

Composite system with the combination of two or more different components have substantial importance because of their potential applications in the catalytic reactions [1-3], drug delivery process [4], development of electrochemical sensor [5] and electronic devices [6]. The use of metal-polymer composites is well documented in structural and electrical applications and also in numerous electronic devices. Semiconducting organic polymer based electronic devices, such as, light-emitting diodes [7], photovoltaic cells [8], transistors [9] and nonvolatile memory [10, 11] have stimulated considerable attention by the scientists because of the various advantages, such as, low fabrication cost, extraordinary mechanical flexibility and the versatile chemical structure. The