

Johnson noise of CdX-P3HT nanocomposite

ABSTRACT

Johnson noise for nanocomposite thin films has been analyzed to study its potential and reliability as an element for electronic devices. Nanocomposite thin films face many challenges such as dispersion of nanoparticles in the matrix that hamper its suitability, competency and performance for potential devices. In this paper, the Johnson noise and current density-voltage has been measured for thin films fabricated through two different methods. The first type of nanocomposite is CdS or CdSe nanoparticles were impregnated in conjugated polymer, P3HT through gas exposure. The second type is by physically mixing CdS or CdSe quantum dots into P3HT. Both nanocomposites employ Langmuir layer as the basis of the film. The Johnson noise for both types of thin films are relatively small, less than $1 \times 10^{-27} \text{ A}^2/\text{Hz}$ for frequency more than 10 Hz, regardless of quantum dots or nanoparticles loading. The JV results show nanoparticles impregnated inside the P3HT have better electrical performance. Thus, the nanocomposites fabricated through gas exposure have better potential to be utilized in electronic devices.

Keyword: Johnson noise; Nanocomposite; Thin films; CdS; CdSe