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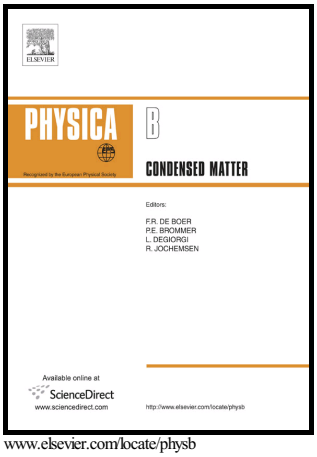

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Saleem I. Qashou[1], A.A.A. Darwish[1,2], M. Rashad[1,3,*], Z. Khattari[4]

[1]Nanotechnology Research Laboratory, Department of Physics, Faculty of Science, University of Tabuk, Tabuk, Saudi Arabia
[2]Department of Physics, Faculty of Education at Al-Mahweet, Sana'a University, Al-Mahweet, Yemen
[3]Department of Physics, Faculty of Science, Assiut University, Assiut, Egypt.
[4]Department of Physics, Faculty of Science, Hashemite University, Jordan.
*Corresponding author. Tel: +966-556061705. mohamed.ahmed24@science.au.edu.eg

Abstract

Both Alternating current (AC) conductivity and dielectric behavior of n-type organic thin films of *N*, *N′*-Dimethyl-3,4,9,10-perylenedicarboximide (DMPDC) have been investigated. Fourier transformation infrared (FTIR) absorption spectroscopy is used for identifying both powder and film bonds which confirm that there are no observed changes in the bonds between the DMPDC powder and evaporated films. The dependence of AC conductivity on the temperature for DMPDC evaporated films was explained by the correlated barrier hopping (CBH) model. The calculated barrier height using CBH model shows a decreasing behavior with increasing temperature. The mechanism of dielectric relaxation was interpreted on the basis of the modulus of the complex dielectric. The calculated activation energy of the relaxation process was found to be 0.055 eV.

***Keywords*:** Organic materials; thin films; AC conductivity; complex dielectric modulus

1. Introduction

Perylene-based organic dye is one of the organic semiconductor materials which have drawn wide attentions not only due to their strong electron accepting and a fast electron transporting properties but also due to their special chemical and thermal stability [1, 2]. Efforts were being made to study perylene derivatives and promoting their properties to combine potential devices into all plastic integrated circuits which are widely used in the application fields of organic electronics and optical devices [3-8]. The *N*, *N′*-Dimethyl-3,4,9,10-perylenedicarboximide (DMPDC) is one of perylene derivatives, which its molecular structure is given in **Fig. 1.** This material is an air-stable n-type organic semiconductor and exhibits high thermal stability [9].