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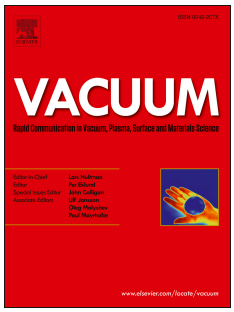

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ACCEPTED MANUSCRIPT

Organic heterostructures obtained on ZnO/Ag/ZnO electrode

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Abstract

This work is focused on the use of multilayer transparent conductive electrode (TCE) based on ZnO/Ag/ZnO in the fabrication of the organic heterostructures. The ZnO/Ag/ZnO obtained combining sputtering/thermal evaporation/sputtering techniques is featured by a good optical transmittance, a low electrical resistivity and a reduced roughness. All these characteristics recommend it as a viable alternative to indium tin oxide (ITO) for different applications. The organic materials, N,N´−diphenyl−N,N´−bis(1−naphthyl)−1,1´−biphenyl−4,4´−diamine (α-NPD), 5,12-Dihydro-5-12-dimethylquino[2,3-b]acridine-7,14dione (DMQA) and 4,7 diphenyl-1,10-phenanthroline (BPhen) were deposited by vacuum thermal evaporation (VTE) method, the properties of the obtained layers being investigated by FTIR, UV-VIS and PL) spectroscopy. The I-V characteristic (recorded in dark) of the organic heterostructure fabricated on the ZnO/Ag/ZnO electrode shows diode behaviour, revealing its potential applications in the organic light emitting devices (OLED).

Keywords: TCE; VTE method; sputtering; organic semiconductors; organic diode

Introduction

In the optoelectronic devices such as organic photovoltaic cells (OPV) and light-emitting diodes (OLED), an important role is played by the transparent conductive electrode (TCE). Due to its optical and electrical properties but also to its stability the most investigated TCE is indium tin oxide (ITO) [1]. Taking into account the scarcity of indium, in the last years the researchers' attention was paid to the development of other TCE having similar properties with those of ITO [2]. In this area, the most studies were focused on: doped metal oxides like In:ZnO (IZO), Al:ZnO (AZO), etc. [3,4], metals such as thin layers or dielectric/metal/dielectric (DMD) [5], nanomaterials like metallic nanowires [6] and conductive polymers [7]. The DMD multilayer transparent electrodes (usually thin) have the following major advantages: use small amounts of materials and present high optical

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