Área: MAT
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Evaluation of the influence of different deposition techniques on the formation of transparent conductive silver nanowire films

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Highlights

Production of transparent conductive silver nanowires (AgNW) films using different deposition techniques.
Assessment of homogeneity and transmittance of AgNW transparent conductive films.

Resumo/Abstract

Transparent conductive films (TCFs) are components of optoelectronic devices, characterized by high transparency and conductivity, being used in various applications, such as displays, solar cells, etc. The most used material in TCFs is ITO (indium tin oxide), with transmittance greater than 90% and low sheet resistance, but it is expensive, its production is harmful to the environment, and, in addition, it is a rigid and fragile, that is, it cannot be used on flexible screens. For the new generation of TCFs, the use of nanomaterials, such as silver nanowires, has been gaining prominence due to their characteristics of flexibility, high conductivity and mechanical resistance, therefore, they can be used in flexible screens [1]. In transparent conductive silver nanowires films production, different deposition techniques can be used, such as dip-coating, drop-casting and spray-casting, which consist of immersing the substrate in a dispersion containing the conductive material, dropping the material dispersed and spraying the dispersion onto the substrate, respectively [2]. Therefore, in this work TCFs containing silver nanowires on flexible substrate using different deposition techniques were produced, aiming to obtain total coverage, greater homogeneity and high transmittance of the films. Afterwards, the films were evaluated and characterized by SEM, UV-VIS and XRD. In the XRD analysis, it was possible to observe reflections referring to the planes (111) and (200) characteristic of Ag-FCC. In the SEM and UV-VIS analyses, it was possible to verify that the films produced with the drop-casting technique showed a greater amount of deposited material, however, with lower transmittance, reaching 83% transmittance at 550 nm for 1 deposited layer. However, the dip-coating and spray-casting techniques were the most homogeneous and presented the highest transmittance, with respectively 92% and 90% at 550nm. According to the results obtained, the techniques that most favor homogeneity and transmittance are dip-coating and spray-casting.

References

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