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Effect of Particle Size and Roughness on Contact Angle of ZnTe Thin Films

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Abstract

Zinc telluride (ZnTe) thin films were prepared by close space sublimation method, and their detailed structural properties and wettability characterization were performed. The XRD analysis of all ZnTe thin films revealed the cubic structure, F-43m space group, regardless of the substrate and source temperatures. The vary of the substrate temperature with 10 °C in the interval (320–360) oC, lead to insignificant changes in the value of the crystallite size, from 32 nm to 27 nm. The same trend is also kept by changing the source temperature. The SEM analysis showed changes in the particle size that is directly related to the substrate/source temperatures. The tendency of the contact angle to increase with the increasing in the substrate and source temperatures of the ZnTe was also observed. The same behavior was revealed for the roughness deducted from the AFM measurements and shown that increasing RMS roughness enlarges the surface area, potentially enhancing the hydrophobicity of ZnTe thin films. The contact angle method shows that hydrophobicity of ZnTe thin films is well tailored by changing the substrate and the source temperatures. The increasing of the hydrophobic properties may lead to the increase of the self-cleaning properties of the solar cells elaborated on the basis of ZnTe thin films.

Keywords: zinc telluride thin films, space sublimation method, crystallites, substrates

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