

SURFACE WETTING PROPERTIES OF ELECTRODEPOSITED AND SPRAYED ZNO NANOROD LAYERS

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Herein we are presenting a comparative study on as-deposited, two-month-stored, and heat-treated ZnO rods obtained by electrodeposition (ED) at 80 °C, and spray pyrolysis (SP) at 550 °C. The aim of the study is to establish the reason for different behaviour of wettability and photocatalytic activity (PA) of ED and SP rods. Samples were studied using XPS, SEM, XRD, Raman, contact angle (CA) measurements and photocatalytic oxidation of doxycycline.

According to the XPS study, as-deposited ED and SP ZnO rods have different chemical composition and defect structure. The relative amount of hydroxyl groups on the surface of as-deposited ED rods is four times higher compared to as-deposited SP rods. Opposite to SP rods, ED rods contain oxygen vacancy defects (Vo). Therefore, as-deposited ED rods are superhydrophilic (CA~3°) and show highest PA among studied samples, being three times higher compared to SP rods (removing of 75 % of doxycycline after 30 minutes). It was revealed that as-deposited ED rods are inclined to faster contamination. The amount of C=C groups on the surface of two-month-aged ED rods is six times higher compared to aged SP rods. Stored ED samples become hydrophobic (CA~120°) and PA decreases sharply while SP rods remain hydrophilic (CA~50°), being more resistive to the contamination. The relationship between the surface composition of as-deposited, aged, and heat-treated ZnO rods, assessment of their surface contamination, wetting properties and photocatalytic performance will be discussed.



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