МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ

ФІЗИКА, ЕЛЕКТРОНІКА, ЕЛЕКТРОТЕХНІКА

ФЕЕ: 2016

МАТЕРІАЛИ
та програма

НАУКОВО-ТЕХНІЧНОЇ КОНФЕРЕНЦІЇ

(Суми, 18–22 квітня 2016 року)

Суми
Сумський державний університет
2016

Superhydrophobic/superhydrophilic switching on the surface of ZnO microstructures caused by UV irradiation and argon ion etching process

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The superhydrophobic materials can be used in manufacturing of the devices and things with the self-cleaning properties (such as solar panels, textiles and building materials, such as glass, tile etc.), coatings with a low friction (such as vehicles), anti-corrosion, anti-icing and antisticking coatings, lab-on-chip devices, drug delivery etc. The effect of a surface morphology on the wettability of ZnO microstructures controlled by the argon ion bombardment or UV light has been investigated. ZnO microstructures of diverse morphology (granular-like, microneedles and microoctapods) are investigated using the water contact angle (WCA) analysis. The samples with a larger surface roughness and surface-to-volume ratio were found to possess a significantly higher water contact angle and the time of transition from the superhydrophobic to the superhydrophilic state. As the most hydrophobic structures (WCA = 157°) would be consirered the complex microoctapods, containing both the macro- and nanoscale features.

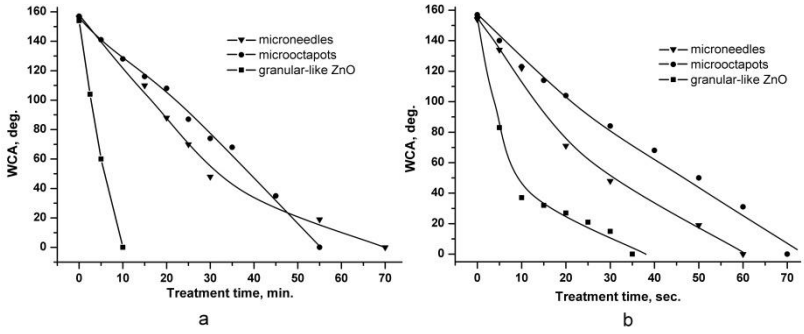

Figure 1 – Change of the water contact angle for ZnO of diverse morphology with time upon: UV irradiation (a) and low energy argon ion bombardment (b).