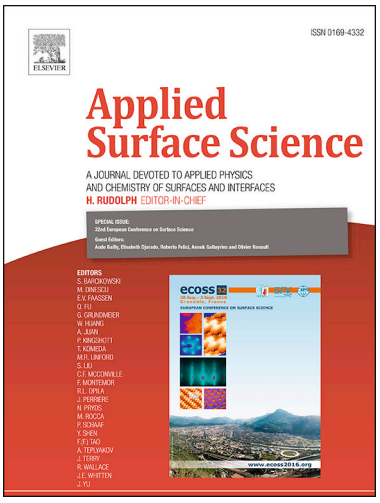
Accepted Manuscript



Full Length Article

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PII: S0169-4332(18)30848-1
DOI: https://doi.org/10.1016/j.apsusc.2018.03.162
Reference: APSUSC 38910

To appear in: *Applied Surface Science*

Received Date: 5 September 2017
Revised Date: 5 March 2018
Accepted Date: 21 March 2018

Please cite this article as: M. Myo Thu, A. Mastuda, K. Yew Cheong, Effects of Drying Temperature on Tomato-Based Thin Film as Self-Powered UV Photodetector, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.03.162

Effects of Drying Temperature on Tomato-Based Thin Film as Self-Powered UV Photodetector

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Abstracts

In this work, tomato thin-film is used as an active natural organic layer for UV photodetector. The effects of drying temperature (60 to 140^0 C) on structural, chemical, electrical and UV sensing properties of tomato thin-film have been investigated. The photodetector consists of a glass substrate/tomato thin-film active layer/interdigitated aluminium electrode structure. As the drying temperature increases, surface and density of tomato thin-film is smoother and denser with thinner physical thickness. Chemical functional groups as a function of drying temperature is evaluated and correlated with the electrical property of thin film. A comparison between dark and UV (B and C) illumination with respect to the electrical property has been revealed and the observation has been linked to the active chemical compounds that controlling antioxidant activity in the tomato. By drying the tomato thin-film at 120^{o}C, a self-powered (V = 0 V) photodetector that is able to selectively detecting UV-C can be obtained with external quantum efficiency (η) of 2.53×10^{-7}%. While drying it at 140^{o}C, the detector is better in detecting UV-B when operating at either 5 or -5 V with η of 7.7384×10^{-6}% and 8.87×10^{-6}%, respectively. The typical response time for raising and falling for all samples are less than 0.3 s.