P.8. Impact of Thermal Treatment Temperature on Copper Oxide Formation from Copper Films

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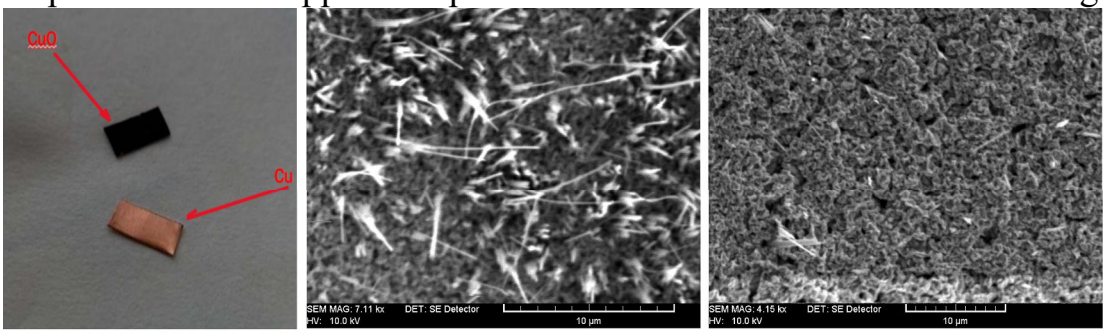
This study investigates the effects of thermal treatment (TT) in air [1] on the morphology and chemical composition of copper oxide (CuO) films using scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDX) [2]. The results demonstrate that the temperature of TT significantly influences the formation of CuO structures. Nanowires were predominantly obtained at temperatures up to 500 °C. However, as the temperature increased, mixed structures of nanowires and CuO layers were formed. A drastic reduction in the number of CuO nanowires was observed at 800 °C. Chemical composition analysis confirmed the formation of CuO. Furthermore, the influence of a gold layer deposited on the copper film prior to thermal treatment was also investigated.



(a) **(b)** **(c)**

Figure 1. (a) Photo of the copper film before and after thermal treatment indicating the formation of CuO. SEM images of Cu films after thermal treatment at temperature of 500 °C (b) and 800 °C (c).

Additionally, it was demonstrated that the obtained CuO films can be detached from the copper substrate through rapid cooling. In contrast, at slow cooling maintaining the sample in the oven until reaching 150 °C before removal, results in the formation of a CuO layer on the copper substrate.

References:

1. Creciunel, C. Controlul inteligent a temperaturii de la distanță elaborat pentru tratamentul termic al foliilor de zinc. In: *Proceedings of the Conferința tehnico-științifică a studenților, masteranzilor și doctoranzilor*; Technical University of Moldova: Chisinau, Moldova, April 5 2023; Vol. 1, pp. 274–278.
2. Monaico, E.V. *Micro- and Nano-Engineering of III-V and II-VI Semiconductor Compounds and Metal Nanostructures Based on Electrochemical Technologies for Multifunctional Applications*; Bons Offices: Chisinau, Moldova, 2022; ISBN 978-9975-166-63-8.