P.6. Remote-Controlled Temperature Setup Designed for ZnO Nanostructures Fabrication

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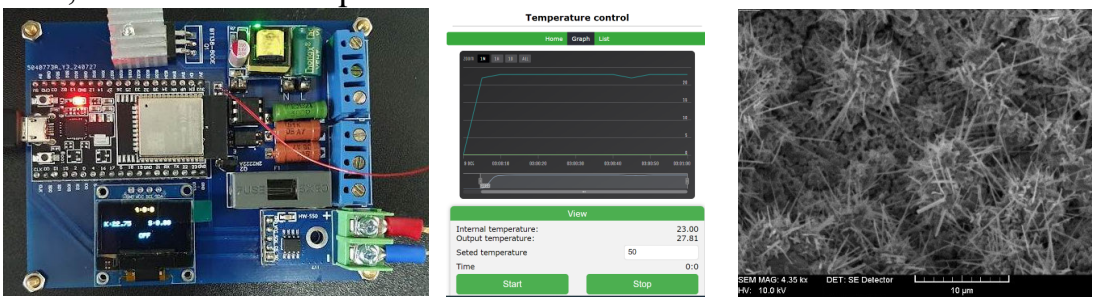
In this work, an optimized remote temperature control and monitoring system is proposed and developed for thermal treatment process. Particularly, Zn foils were used in experiments in order to fabricate ZnO nanostructures. Zinc oxide is an important material with multiple applications that can be synthesized through various methods, including thermal treatment [1], electrochemical etching [2,3], etc. To perform the thermal treatment, a control circuit was developed based on the ESP32 microcontroller presented in Fig. 1a. This setup ensures galvanic isolation using an optotriac and optotransistor to control the 220V signal via the BT138 triac. The software solutions are implemented with FreeRTOS, allowing the creation of a graph that tracks the temperature inside the reactor, the time elapsed since the target temperature was reached, and the option to set the desired duration (Fig. 1b). After the thermal treatment, the zinc foils were analyzed using SEM (Fig 1c), EDX, and XRD techniques.



(a) (b) (c)

Figure 1. (a) Real photo of the elaborated device; (b) Web interface; (c) SEM image of the obtained ZnO nanostructures after annealing process of Zn foil.

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References:

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[2] C. Creciunel, Obținerea și studiul straturilor de oxid de zinc prin corodarea electrochimică a 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. 279–283.

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