

RESUMO - CIÊNCIA DOS MATERIAIS

**ENHANCEMENT AND RELIABILITY ASSESSMENT OF THE LUMI 22
THERMOLUMINESCENCE SYSTEM**

Chibuike Collins Nwonye (collins.nwonye@unesp.br)

Matheus Cavalcanti Dos Santos Nunes (matheus.c.nunes@unesp.br)

Neilo Marcos Trindade (neilo.trindade@usp.br)

The customized LUMI 22 system was originally designed for thermoluminescence (TL) and radioluminescence (RL) measurements [1]. The system was randomly raise the temperature of samples instead of following the specified heating rate per second for each sample type which is crucial parameter for the effective occurrence of the TL signal. The system also consumed so much energy to raise the temperature of the sample up to 600 degree Celsius. We modified the TL system to have the capacity of raising the temperature of samples according to the sample's specification. We also modified the system to raise the temperature with low energy supply, again the TL system heats the sample with alternating current (AC) signal which is not good for sensitive laboratory equipment with high degree of precision so we modified the heating system to operate with direct current signal (DC) instead of (AC) [2]. To modify this TL system to meet up with this specifications, we

developed an equation that relates heating parameters and voltage. To achieve a low power heating system, a kanthal wire of diameter 0.404mm, length of 1 meter, mass of 1gram and shaped in a spiral form based on the heating analysis. The shape, length diameter and mass of the kanthal wire becomes the model to achieving 31 watt low power heating system. After the implementation, the systems change in temperature and the system's power were monitored and were perfectly in order.

References

- [1] M. C. S. Nunes, M. L. Rodrigues, W. J. R. Silva, R. S. Silva, N. K. Umisedo, E. M. Yoshimura, and N. M. Trindade, "A custom-made integrated system for thermoluminescence and radioluminescence spectroscopy," *Applied Radiation and Isotopes*, vol. 214, 2024, doi: 10.1016/j.apradiso.2024.111516
- [2] Kerkman, R. J. (1999). EMI emissions of modern PWM AC drives. *IEEE Industry Applications Magazine*, 5(6), 47–81.

Palavras-chave: thermoluminescence; radio luminesce; kanthal.