

## **Thick films based on *Te-NaNO<sub>3</sub>* nanocomposites: structure and electrical conductivity**

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### **Abstract:**

The *Te-NaNO<sub>3</sub>*-based nanocomposites were synthesized via a hydrothermal method that consists in dissolving of polycrystalline tellurium powder in diluted nitric acid, followed by its subsequent reducing with sodium dithionite. The yielding solid products, separated by successive filtration, were deposited on flexible paper substrates using the doctor blade method. The fabricated films were dried at room temperature for 24 hours before characterization. The thickness of the films was estimated to be around 35  $\mu\text{m}$ . The structure and morphology of the films were investigated via SEM, EDX and XRD methods, which have revealed the presence of both Te nanowires and *NaNO<sub>3</sub>* nanoparticles randomly distributed in the films. The functional structures for the study of electroconductivity have been fabricated by depositing the contact aluminium electrodes on top of the films, in a planar arrangement. The electrical conductivity of the films has been studied in the 20 ÷ 180 °C temperature range. It was established an exponential increase of electroconductivity with temperature increases, so that an almost linear dependence of  $\ln\sigma - 1/T$  occurs. The relatively low activation energy assessed as 0,14 eV, points to the electronic charge transport mechanism via tellurium nanowires network to be the main, with an additional contribution from ionic species originating from *NaNO<sub>3</sub>* component. Thus, the *Te-NaNO<sub>3</sub>* nanocomposite-based films emerge as promising materials, which exhibit the both electronic and ionic conductivity.

**Keywords:** Nanocomposites, *Te-NaNO<sub>3</sub>*, electrical conductivity, paper substrate

### **References**

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### **Acknowledgement:**

This work was supported by Ministry of Education and Research of the Republic of Moldova; Institutional subprogram **021201**