
T1-I: Flexible thin films based on Te-SnO₂ nanocomposites and their gas sensing properties

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Printed electronics becomes very attractive due to the ability of using sustainable, compostable and recyclable materials including biobased plastics and paper in the elaboration of different flexible thin-film sensors, transistors and systems [1]. In this talk I will present information related to development of flexible sensors based on printable Te-SnO₂ nanocomposites for the detection of toxic and pollutant gases at room temperature. A brief review of fabrication, physical properties and application of both elemental tellurium and tin oxide in technology of the chemical sensors is reported and discussed in context of the development of the novel nanocomposites based on these very different semiconducting materials. Being synthesized these nanocomposites appeared to be suitable for the application in printed electronics for fabrication of flexible gas sensors, enabling low-cost fabrication through computer aided designs. The fabrication route of Te-SnO₂ nanocomposites consists of solvothermal recrystallization of pure (99.999 %) crystalline tellurium in acids. The composition and structure of synthesized nanocomposites were investigated by energy-dispersive X-ray spectroscopy (EDX) and XRD. Flexible thin films based on Te-SnO₂ nanocomposites have been fabricated and their surface morphology studied via scanning electron microscopy (SEM). The films were cut and used as active elements in developed devices for detection of toxic gases in ambient air at room temperature. Fig.1 shows the image of a fabricated flexible thin film based on Te-SnO₂ nanocomposites and dynamic response of such a film under exposure to rectangular pulses of a very toxic gas (NO₂) of a low (0,1ppm) concentration in ambient air. Gas sensing characterization of such films was realized dependent on concentration of different gases, temperature and humidity of the ambience. The sensing mechanism is proposed and discussed.

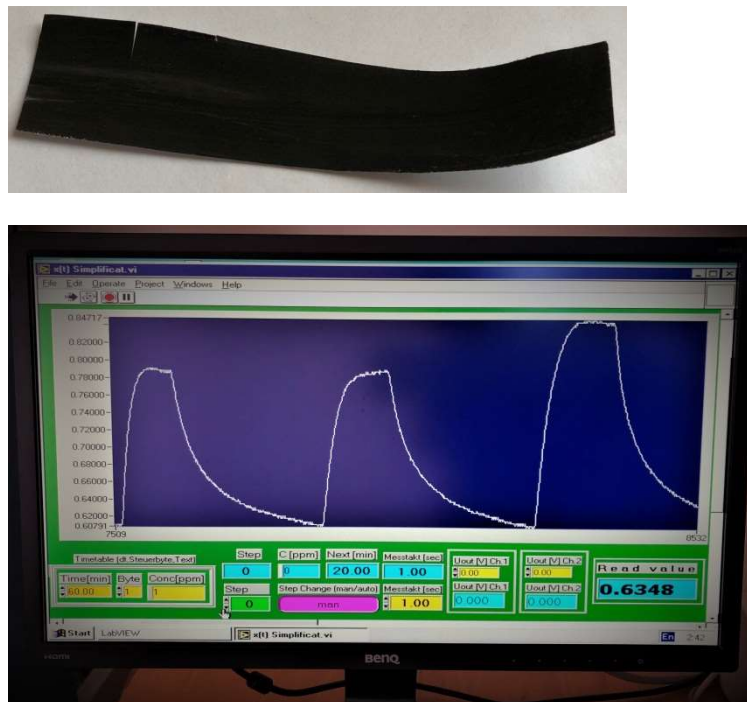


Fig.1. The image shows the view of a flexible thin film based on Te-SnO₂ nanocomposites and its dynamic response to rectangular pulses of 1.0 ppm in ambient.

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