T1-I: Flexible thin films based on Te-SnO_2 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-SnO_2 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 sinthethized these nanocomposites appeared to be suitable for the application in printed electronics fo fabrication of flexible gas sensors, enabling low-cost fabrication through computer aided designs.

The fabrication route of Te-SnO_2 nanocomposites consists of solvothermal recrystallization of pure (99.999 %) crystalline tellurium in acids. The composition and structure of siththethized nanocomposits were investigated by energy-dispersive X-ray spectroscopy (EDX) and XRD. Flexible thin films based on Te-SnO_2 nanocomposits have been fabricated and 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 ambiance at room temperature.

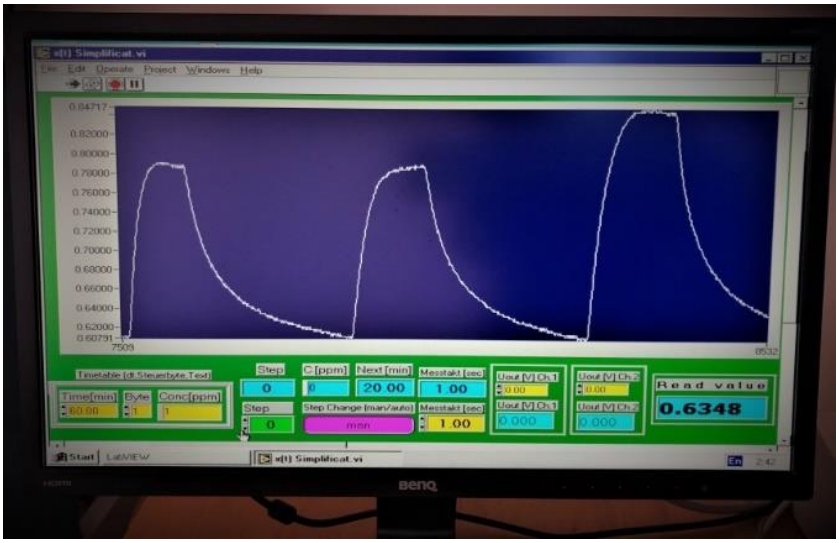

Fig.1.The image shows the view of a flexible thin film based on Te-SnO_2 nanocomposites and its dynamic response to rectangular pulses of 1.0 ppm in ambiance.

Fig.1 shows the image of a fabricated flexible thin film based on Te-SnO_2 nanocomposites and dynamic response of such a film under exposure to rectangular pulses of a very toxic gas (NO_2) 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 ambiance. The sensing mechanism is proposed and discussed.

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