

Moldova

Technical University of Moldova

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Title Project title: **NATO Science for Peace and Security Programme (SPS) under grant G5634 „Advanced Electro-Optical Chemical Sensors” AMOXES**

Authors Research title: **Sensing performance of CuO/Cu₂O/ZnO:Fe heterostructure coated with ultrathin hydrophobic polymer for battery application**

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Description This study reports on a new type of gas sensor based on semiconductor oxides that is capable to solve the problem of the effect of high relative humidity on sensory performance with the possibility of application in the early detection of dangers to Batteries. Sensitive nano-materials of CuO/Cu₂O/ZnO:Fe heterostructures are grown by SCS approach developed at the Technical University of Moldova and subsequently coated with an ultrathin hydrophobic polymer film to protect the sensor from moisture. Surface chemistry, film formation and preservation of functional groups is confirmed by XPS and FTIR. It turns out that the hydrophobicity is retained even after annealing at 400°C, which is ideal for gas sensing. Compared to unprotected CuO/Cu₂O/ZnO:Fe the coated CuO/Cu₂O/ZnO:Fe exhibit a much better sensing performance at higher relative humidity as well as tunability of the gas selectivity. This is highly beneficial for the hazard detection in case of thermal runaway in batteries, because the sensors can be used under high concentrations of relative humidity that is ideal for real electrical battery applications.

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