## Nanostructured surfaces

# Surface XPS and UPS investigation of *in situ* prepared $As_xSe_{100-x}$ nanolayers and their modification under external influence

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The surface structuring and processes occurring at the surface and sub-surface nanolayers and related changes of physico-chemical properties of the surface play a crucial role for the modern application of nanomaterials. Therefore, the characterization of local structure of the surface and its modification induced by external influence are of great scientific importance from both fundamental and applied points of view [l].

In this report, we focused on amorphous $As_xSe_{100-x}$ (x = 40, 50) thin films with thickness of about 0.1 μm prepared *in situ* by thermal evaporation from bulk glass onto cleaned (100) Si wafer substrates, which were then annealed and aged during 1 week in air. The atomic stoichiometry, local chemical structure as well as electronic properties of the surfaces of as-deposited, annealed and aged As-Se nanolayers were examined by XPS and UPS methods. The formation of additional Se-Se and As-As homopolar bonds and appearance of oxygen on the surfaces of materials due to aging effect were observed and the related chemical re-bonding is discussed in detail. A DFT electronic structure calculations were also performed in order to assist the unambiguous interpretation of the experimental results.

1. O. Kondrat, R. Holomb, A. Csik, V. Takats, M. Veres and V. Mitsa, Coherent light photo-modification, mass transport effect and surface relief formation in $As_xS_{100-x}$ nanolayers: absorption edge, XPS and Raman spectroscopy combined with profilometry study, *Nanoscale Research Letters* 2017, **12**:149, **DOI:**10.1186/s11671-017-1918-y.