STUDY OF ELECTRON BEAM AND LASER BEAM INTERACTIONS WITH CHALCOGENIDE GLASSES

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Chalcogenide amorphous glasses when irradiated with light, exhibit various intriguing phenomena such as material flow, local expansion or contraction, and sometimes change in chemical composition. On microscopic level, the mechanism behind photosensitivity involves the creation of electron–hole pairs, which change the valence of neighbouring atoms and their chemical bonds, thereby creating coordination defects. Such bond switching by illumination which are direction when light is polarized, results in macroscopic changes in the physical properties of the material, in our case increase of photofluidity. Many of these effects, although still observable in bulk glasses, become particularly pronounced in thin films. Light interference on structures generated by electron beam and photoinduced glass mass flow be used to create complex interference patterns, in ternary $Ge_xAs_ySe_z$ thin films [1]. Electron beam can induce similar effects on the surfaces of these materials [2]. The electron beam interacts strongly with binary Ge-Se, Sb-Se, As-Se systems, which leads to their softening, crystallization or material mass transport. As a result, various surface reliefs can be produced [1]. In our report we summarize our recent results which describe mechanisms behind surface relief formation during interaction with electron beam and laser beam. We will also compare composition related dependencies of and sensitivity of these systems. We will discuss applications of chalcogenide-based systems in catalysis and in direct patterning of surfaces by electron beam and laser beam.

References:

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