

8<sup>th</sup> International Conference and Exhibition on

## MATERIALS SCIENCE AND ENGINEERING

May 29-31, 2017 Osaka, Japan

## Applications of chalcogenide Ge-Sb-Se glass used for the molded lens of thermal camera using far infrared

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Chalcogenide glasses including chalcogen elements sulfur, selenium and tellurium, have been studied in optics system for their unique properties including high refractive index and non-linearity. Among various chalcogenide glasses, Ge-Sb-Se glasses show a good transmittance in the NIR and midIR spectrum from 2  $\mu\text{m}$  ~ 16  $\mu\text{m}$  and have excellent moldability for making molded lens. In order to find optimal lens molding conditions, we investigated thermal properties of Ge-Sb-Se glasses by varying different composition ratio. All of glass samples were synthesized by using melt-quenching method in rocking furnace. The samples are categorized with two kind of chemical formula;  $\text{Ge}_{(30-x)}\text{Sb}_{(10+x)}\text{Se}_{60}$  and  $\text{Ge}_{(32.5-x)}\text{Sb}_{10}\text{Se}_{(57.5+x)}$ . To confirm amorphous phase of samples, X-ray diffraction measurement was performed. The thermal and thermomechanical properties of Ge-Sb-Se glass sample were investigated using Differential Scanning Calorimetry (DSC) and thermo mechanical analyzer (TMA), respectively. According to increase of Ge element, Mean Coordination Number (MCN) is increased. We found that the glass transition temperature ( $T_g$ ) of  $\text{Ge}_{(30-x)}\text{Sb}_{(10+x)}\text{Se}_{60}$  decreased as the increase of MCN of  $\text{Ge}_{(30-x)}\text{Sb}_{(10+x)}\text{Se}_{60}$ . It is concluded that the thermal behavior of Ge-Sb-Se glass system is related to the mean bond energies of the elements. Finally, we optimized molding condition of chalcogenide glass system with their thermal properties.

## Biography

June Park earned his Ph. D in Physics at Chung-Ang University, Republic of Korea, in Feb. 2011. He had studied optical properties of nanomaterials including carbon nanotubes, graphene and carbon related materials in his thesis. He worked as a PostDoc. with experience in synthesizing 2 dimensional materials for use in sensor, optical fiber laser and electronic devices using CVD mainly. Now, he is working for optical lens system at Korea Photonics Technology Institute.

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