NANO-MECHANICAL BEHAVIOR OF ULTRA-STABLE AMORPHOUS METALLIC THIN FILM

Jeong-Hyun Woo, UNIST, South Korea
woojh@unist.ac.kr
Sun-Young Park, UNIST, South Korea
Ju-Young Kim, UNIST, South Korea

Metallic glass has amorphous structure that behave mechanically like solids but show catastrophic failure due to shear band propagation induced by short range order structure, and they are generally produced by quenching. Recently, it is observed that the slower cooling rate provides the larger time available for atoms to rearrange structure before freezing in glassy state, leading to glass transition temperature and thermal stability. These glasses with enhanced thermal stability synthesized by controlled cooling rate make it useful in various field such as mechanical or oxidation protection material. However, mechanical behavior for metallic glass with extraordinary thermodynamic and kinetic stability has not been studied. In this research, we developed a ultrastable metallic glass thin film by physical vapor deposition process at ambient temperature. Thermal stability is investigated using acceleration testing. Mechanical properties are measured using in-situ tensile testing and discuss thermal stability and fracture behavior dependent on composition