



The study of hardness of CuZr amorphous thin film by nanoindentation

by Mr. Wang Zhitao

Date: 08th October 2009 (Thursday)

Time: 12:00pm to 12:30pm

Venue: EA-02-11 (Executive Seminar Room)

Abstract

Metallic glasses are amorphous metals that do not have a structure with long range atomic order like crystalline materials do, but have pronounced short- and medium-range order at the atomic scale. Because of their high strength and high elastic modulus compared to those of their crystalline counterparts, the mechanical behaviors of metallic glasses have received extensive interests in the past few decades. The packing density of amorphous phase is generally thought to be related with glass structure and mechanical property, but this correlation has not been demonstrated experimentally to date. In this work, a wide compositional range of amorphous thin films were synthesized and the hardness of the films was investigated by nanoindentation. Systematic hardness measurements using nanoindentation and a combinatorial-deposition method show a correlation between glass-forming ability and the hardness of amorphous thin films in the Cu-Zr binary system. Distinct peaks in the hardness of the amorphous films were found to match with specific maxima in the critical thickness for glass formation. The peaks of hardness were interpreted in terms of free volume theory. The experimental methodology adopted in this work can provide an easy way for searching new glass-forming alloys.

Mr. Wang Zhitao Speaker

Mr. Wang Zhitao was graduated from Harbin Institute of Technology and obtained his Bachelor's and Master's degree in 2006 and 2008, respectively. He is now a Ph.D candidate in the Department of Materials Science and Engineering, NUS. His current research interests on the mechanical behaviors of metallic glasses and is under the supervision of Professor Li Yi.

Dr Xue Jun Min Host

All are Welcome!