Seminar 1: Metallic glasses in the laboratory MATEIS, in INSA-Lyon, France

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Seminar 2: Influence of spark plasma sintering parameters on the mechanical properties of Cu$_{50}$Zr$_{45}$Al$_5$ bulk metallic glass obtained using metallic glass powder

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Abstract (Seminar 1)

Researches on metallic glasses in in the laboratory MATEIS (INSA-Lyon, France) has started a long time ago, with some investigations on thin amorphous ribbons. Since the development of bulk metallic glasses, this activity has been reinforced.

This presentation will address the various aspects of the investigations developed recently. Various aspects will be detailed. Mainly two points will be presented:
- The physical aspect of the deformation, especially using DMA measurements.
- Different applications:
  - Bulk metallic glasses for jewelry and watch making
  - Bulk metallic glasses for biomedical applications
  - Thin metallic glass films.

About the Speaker (Seminar 1)

Ph. D in Material Science (1975); Doctor in sciences (1980)
Professor in INSA de Lyon, France, laboratory MATEIS (UMR CNRS 5510) (1998+)
Research Interests:
- Scientific production: author or co-author of over 130 publications in the scientific literature, and has contributed chapters to 2 books; 75 proceedings and more than 100 oral presentations in international conferences;
- Fields of interest in material science and engineering
  - phase transformations
  - material transformation and surface engineering using high power lasers
  - mechanical response of crystalline and amorphous materials (oxides, bulk metallic glasses, polymers)
- Responsibility of PhD (12) and Master (40) students

Teaching:
- Bachelor level in INSA: Physics, Chemistry, Computer Science
- Department of Material Sciences at INSA (SGM Department): Mechanical properties, microstructure

Abstract (Seminar 2)

Gas atomized Cu_{50}Zr_{45}Al_{5} amorphous powder was densified by spark plasma sintering, in order to obtain bulk metallic glasses with larger size than that obtained by the conventional casting strategy. The influence of different parameters was investigated: sintering temperature, isothermal holding time as well as size of the specimens. After optimization of the processing parameters, dense and amorphous specimens were elaborated with a diameter up to 30 mm. Thermal stability and mechanical properties of consolidated samples are similar to those of Cu_{50}Zr_{45} Al_{5} cast alloy. A hardness of 535 HV and a compressive strength
of 1600 MPa have been obtained. Fractographic investigation indicated an intergranular rupture mode which leads to lower toughness compared to as the cast material, but for these samples the size is limited to 3 mm. However an increase in applied pressure (from 90 MPa to 1 GPa) induces a significant improvement in bonding between powder particles.

About the Speaker (Seminar 2)

Her current research interests include the development of bulk metallic glasses (BMGs) and BMG matrix composites by using spark plasma sintering method, the glass forming ability, thermal stability and mechanical properties of precious metal based amorphous alloys.

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All are Welcome!