2009 Spring **03. 04. 2009**

Advanced Physical Metallurgy

"Amorphous Materials"

_____ – from the Greek for "without form" – refer not to materials that have no _____, but rather to materials with no _____. The atoms or molecules of amorphous materials are arranged in essentially the same manner as they are in a _____. An amorphous material is still _____ – the molecules are closely packed and chemically bonded, and the materials exhibits an elastic response to _____ – but the spatial arrangement of the atoms is nearly _____. In contrast, the building blocks of crystalline solid are arranged in orderly, 3-dimensional, _____ arrays.

Also know as non-crystalline solids, glasses, or disordered solids, amorphous materials are characterized by their _____ rather than their _____. This is because, under the right conditions, _____ can be prepared as an amorphous solid. All amorphous materials have _____. The _____ form will generally be more stable and chemical equilibrium, whereas the amorphous form is not.

Preparing an amorphous solid requires _____ to avoid _____. The cooling rate that constitutes rapid cooling varies with the type of material. Form metals, the speeds of cooling limit the _____ of metallic glasses, even for the newly developed bulk metallic glasses. Many ceramics and many polymer blends are more _____ prepared as glasses; some are ubiquitous and familiar.

Amorphous materials – whether metals, ceramics, or polymers – are characterized by a _____. This structure is readily evident from a comparison of the _____ of an amorphous material to that of a liquid. The structure of amorphous materials leads to distinctive _____ such as transparency, plasticity, and elastic recoil.

particular structure / diffraction pattern / periodic / solid / liquid / liquid-like structure / easily / structure / composition / Amorphous / crystalline counterparts / size / shape / crystallization / properties / rapid cooling / crystalline / any material / random / shear stresses /

Prof. Eun Soo Park
Department of Materials Science and Engineering/Seoul National University