2010 Spring

# "Amorphous Materials"

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# • Amorphous vs Nanocrystalline

*1) Microstructural observation*

***XRD, (HR)TEM, EXAFS …***

*2) Thermal analysis*

***DSC (Differential Scanning Calorimetry)***

**: Measure heat absorbed or liberated during heating or cooling**

***cf) - glass → nucleation & growth***

***(perfect random)***

- ***local clustering*: quenched-in nuclei → *only growth***
- ***Nanocrystalline → growth***

**→ local clusters with atomic scale are difficult to identify by conventional observation tools of microstructure.**

**: *Characterization of structure by pair distribution function***

***3) Intensive Structural Analysis*: *radial distribution function***

# *Contents for today's class*

- **Preparation of amorphous materials**

**Sputtering** — Surface coating

**Thermal evaporation**

**Glow-discharge decomposition**

**Chemical vapor deposition**

**electrolytic deposition**

**Gas atomization** — powder

**Melt-spinning** — thin film

**Splat quenching** — thin plate

**Droplet quenching** — Bulk type : sphere, rod, plate

**water quenching**

**Injection casting** **Strip casting**

**Suction casting** **Squeeze casting**

**Centrifugal casting**

**Electrostatic levitation**

**Irradiation**

**Pressure-induced amorphization**

**Solid-state diffusional amorphization**

**Computer simulation**