# Crystallization of an Amorphous Oxide in La-Nb-O System

# Abstracts of Papers on Amorphous Materials Published in Other Journals

**Unusual Glass Formation in the Al-Nd-O System**

Seishi YAJIMA, Kiyohito OKAMURA and Toetsu SHISHIDO

Chemistry Letters (1973), 741.

A new oxide glass in the Al-Nd-O system was made through fusing by arc plasma torch and rapid quenching by a particular device although, in this system, so far it was very difficult to realize the glassy state. Quenched material of about 5 mm in diameter and about 1 $\mu$ in thickness was examined by polarizing microscope and by X-ray diffraction technique. The results clearly showed the existence of the glassy state.

**Glass Formation in the Ln-Al-O System (Ln: Lanthanoid and Yttrium Elements)**

Seishi YAJIMA, Kiyohito OKAMURA and Toetsu SHISHIDO

Chemistry Letters (1973), 1327.

Oxide glasses in the Ln-Al-O system were prepared with the molar ratio of $Ln_2O_3$:$Al_2O_3$ of 10:1 to 1:10 for all the lanthanoids and yttrium by an impact quenching technique. Each quenched material was examined by polarizing microscope, X-ray diffraction and electron diffraction. The electron diffraction patterns show diffuse halos characteristic of an amorphous state.

**Synthesis of Lanthanoid Aluminates ($\beta$-$Al_2O_3$ Type) Using Arc Plasma Flame**

Seishi YAJIMA, Kiyohito OKAMURA and Toetsu SHISHIDO

Chemistry Letters (1973), 1331.

New compounds with approximate formulas, $La_2O_3 \cdot 7Al_2O_3$, $Pr_2O_3 \cdot 7Al_2O_3$, $Nd_2O_3 \cdot 8Al_2O_3$ and $Sm_2O_3 \cdot 7Al_2O_3$, have been obtained through melting by arc plasma flame and separated into their own single phases by a proper chemical treatment. All of the compounds have the $\beta$-$Al_2O_3$ type structure. Excepting only $La_2O_3 \cdot 7Al_2O_3$, these compounds have the $\beta$-$Al_2O_3$ type structure at temperatures higher than 1500°C.

**Crystallization of an Amorphous Oxide in La-Nb-O System**

Seishi YAJIMA, Kiyohito OKAMURA and Toetsu SHISHIDO

Chemistry Letters (1974), 221.

An amorphous oxide of which composition corresponds to $La_2O_3 \cdot 5Nb_2O_5$ was prepared by making use of an impact quenching technique. The phase transformation from an amorphous to an equilibrium crystalline state was studied by

means of differential thermal analysis (DTA) and X-ray diffraction. From the experimental results, the crystallization process was characterized mainly by the two successive transitions, i.e., glassy phase → a new metastable phase → stable phase of $La_2O_3 \cdot 5Nb_2O_5$.

**Mössbauer Measurements of Iron Atoms Dispersed in Amorphous Glass-like Carbon**

Seishi YAJIMA and Mamoru OMORI

Chemistry Letters (1974), 277.

Various iron species have been prepared by pyrolyzing acetylferrocene-furfural resins at 400°C in vacuum, and analysed by means of Mössbauer spectroscopy. The Mössbauer spectra show that the iron species in an amorphous glasslike carbon matrix are free iron atoms, $Fe^+$ ions, iron clusters, superparamagnetic irons and ferromagnetic irons.

**Crystallization of $3Ln_2O_3 \cdot 5Ga_2O_3$ Glasses**

Seishi YAJIMA, Kiyohito OKAMURA and Toetsu SHISHIDO

Chemistry Letters (1974), 545.

The oxide glasses of $3Ln_2O_3 \cdot 5Ga_2O_3$ were prepared, using Pr, Nd, Sm, Eu or Gd as a lanthanoid element. Crystallization of the glasses was studied by DTA and X-ray diffraction. A metastable phase was found on the way of the crystallization process of $3Pr_2O_3 \cdot 5Ga_2O_3$ and $3Nd_2O_3 \cdot 5Ga_2O_3$ glasses terminating in the transition into garnet. However, the phase transition transforming the amorphous phase directly into garnet not through a metastable phase was observed in case of $3Ln_2O_3 \cdot 5Ga_2O_3$ glasses (Ln=Sm, Eu or Gd).

**$3Gd_2O_3 \cdot 5Fe_2O_3$ Glass Obtained by Rapid Quenching Apparatus Using Laser Beam**

Seishi YAJIMA, Kiyohito OKAMURA and Toetsu SHISHIDO

Chemistry Letters (1974), 1531.

The oxide glass of $3Gd_2O_3 \cdot 5Fe_2O_3$ (GIG) was prepared using the piston and anvil technique incorporated into a laser melting furnace. The quenching apparatus provides higher quenching rates than an impact quenching apparatus already made. Crystallization and magnetization of the GIG glass have been examined by means of DTA method and magnetic balance.

**Amorphous Phase in Yttrium-Cobalt-Boron System**

Seishi YAJIMA, Kiyohito OKAMURA and Toetsu SHISHIDO

Chemistry Letters (1975), 1227.

By rapid quenching of the melt, an amorphous phase of yttrium-cobalt-boron system was obtained. The phase is stable at room temperature, and its crystallization takes place in the vicinity of 700°C on heating at 10°C/min. Electrical