

## LABORATORY OF INORGANIC SYNTHESIS

Chief: Dr. Toshio Takada

Head: Dr. Yoshichika Bando

This laboratory was established in 1970 to develop the fundamental research on inorganic synthesis and crystal growth. In 1970, Professor K. Takezaki, director of this institute, was appointed as chief of this laboratory. In 1971, Prof. Yoshichika Bando transferred from laboratory of solid state chemistry to this laboratory as the head. Since 1964, he had been engaged in the fundamental researches on the preparation and physical properties of transition metal oxides and hydroxides in this institute. Publications of the laboratory of solid state chemistry contains his publications from 1966 to 1971. In 1971, Professor Toshio Takada, head of laboratory of solid state chemistry, was appointed as chief of this laboratory.

Under the supervision of Professor Y. Bando, the syntheses of transition metal oxides from gaseous, solid and liquid state, and their characterization are presently investigated.

### 1. Growth of Single Crystals of Oxides by Travelling Solvent Zone Melting (T. S. Z. M.)

Crystal growth of oxides by T. S. Z. M. method is investigated using the apparatus of an infrared heating type. In this technique, a melt zone containing solvent is sandwiched between a polycrystalline feed and a seed and displaced along the feed. This technique has the advantage for single crystal growth of the material which melts incongruently and has phase change. Growth of large single crystal of YIG and barium titanate is attempted.

### 2. Preparation of Iron Oxide Films by Reactive Evaporation

The thin films of  $\text{Fe}_3\text{O}_4$  and  $\alpha\text{-Fe}_2\text{O}_3$  were obtained by evaporation of iron metal in an oxygen atmosphere from  $10^{-3}$  to  $10^{-5}$  Torr. The  $\text{Fe}_3\text{O}_4$  films obtained were useful as high density recording media and had the advantage that their resistance to wear and corrosion was high. The epitaxial growth of iron oxides on rock salt is investigated by electron diffraction.

### 3. Chemical Transport Reaction

The growth of single crystals of nonstoichiometric oxides such as  $\text{V}_n\text{O}_{2n-1}$ ,  $\text{Ti}_n\text{O}_{2n-1}$ , and  $\text{Mo}_n\text{O}_{3n-1}$  had succeeded by chemical transport reaction using  $\text{TeCl}_4$ . Gas molecular species prepared in the reaction have been investigated using a quadrupole mass spectrometer.