

## 6. Magneto–Archimedes Levitation and Holding of Aluminum Fragment (Videos: 13 and 14)

### <Explanation>

In order to investigate the capability of maintaining stable levitation in a solution for a long time, an aluminum fragment (a cylindrical fragment of 2~3mm in diameter, density  $2.69 \times 10^3 \text{ kg/m}^3$ , mass susceptibility  $7.67 \times 10^{-9} \text{ m}^3/\text{kg}$ ) was put in a solution of gadolinium chloride so that the specimen could be levitated by the effect of magneto-Archimedes levitation. Two kinds (A, B) of gadolinium chloride solutions in different concentrations were used in this experiment, 0.48mol/kg for A and 0.30 mol/kg for B. For the magnetic flux density to maintain stabilized holding, 6.10 T was used for A and 8.44T for B. The temperature of the solution was maintained constantly at 25°C.

Case A is shown in **Video 13** while case B is in **Video 14**. The videos show the scenes photographed sideways at intervals of 30 seconds. In both cases, the stable levitation of an aluminum fragment in the solution is successful for more than an hour. However, a slight and vertical displacement of the aluminum fragment can also be perceived. The reason is considered to be due to the effect of thermal convection, but details remain unknown.

### <Place of execution>

National Institute of Advanced Industrial Science and Technology, Kansai

### <Presentation>

S. Maki and M. Ataka,

“Magneto-Archimedes levitation of a number of substances: In-situ observation using pictures obtained by a CCD camera”,

*The International Symposium on Magneto-Science 2005, 14-17 November, 2005, Yokohama, Japan, (2005).*