TAIHEIYO CEMENT
NEWS LETTER

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# Taiheiyo Cement Starts Experimental Test of CellSpheres™, Micro Functional Hollow Particles with Mean Particle Diameter of 5μm or Smaller

**Taiheiyo Cement Corporation (Headquarters: Minato-ku, Tokyo; President: Masafumi Fushihara) is engaged in development of CellSpheres™, micro functional hollow particles made of inorganic oxide, which have a mean particle diameter of 5μm or smaller, and has started its experimental test on the scale of commercial production, aiming to promote its practical realization.**

Because the inside is hollowed, hollow particles have superior heat insulating and lightweight properties. They have been penetrated as add-in materials for heat insulation paint or filler materials* for resin products, and they also attracted attention in recent years from the viewpoint of energy saving. Along with thinner coating materials and lighter-weight/smaller resin products and electronic equipment, etc., hollow particles with a small particle diameter are demanded. However, since the hollow particles available in the market have a mean particle diameter of several dozens of μm or larger, it was difficult to apply them to thin or minute parts.

We have successfully developed CellSpheres™, micro functional hollow particles made of inorganic oxide, which have a mean particle diameter of 5μm or smaller, by combining the high-temperature firing techniques for inorganic materials with the evaporative decomposition method, which allows mass production of micro particles.

Because CellSpheres™ has a small mean particle size, it can be applied to thin films and minute parts of 100μm or less, for which it was difficult to use existing hollow particles because of their particle sizes. The outer shell that forms the particle is as thin as 0.01 to 0.1μm, and its high hollowness of 70% or more, which realizes light weight and a heat conductivity similar to that of the air. As a result, it can improve the heat insulating properties of resin products and drastically reduce their weight. In addition, the 5th generation mobile communication system (5G), whose development is advancing in recent years, requires improvement of the dielectric property of electronic substrates. This material has a relative permittivity that is about half of that of the general filler materials (e.g. silica) used for electronic substrates and can be expected to improve dielectric properties. Furthermore, because it is inorganic oxide, the hollow shape can be retained even at a high temperature of 700°C, which means it has a higher heat resistance than polymer hollow particles and is applicable to the parts that are exposed to high temperature such as aircrafts and vehicles.

This time, we have installed a facility on the scale of commercial production, whose annual production capacity is about 7 tons, in a plant of our group company and started its experimental test to prepare a sample supply aiming at its commercialization. In future, we will proactively and quickly work on technological development of CellSpheres™ to meet the market needs.

* Filler materials: Fillers, add-in materials

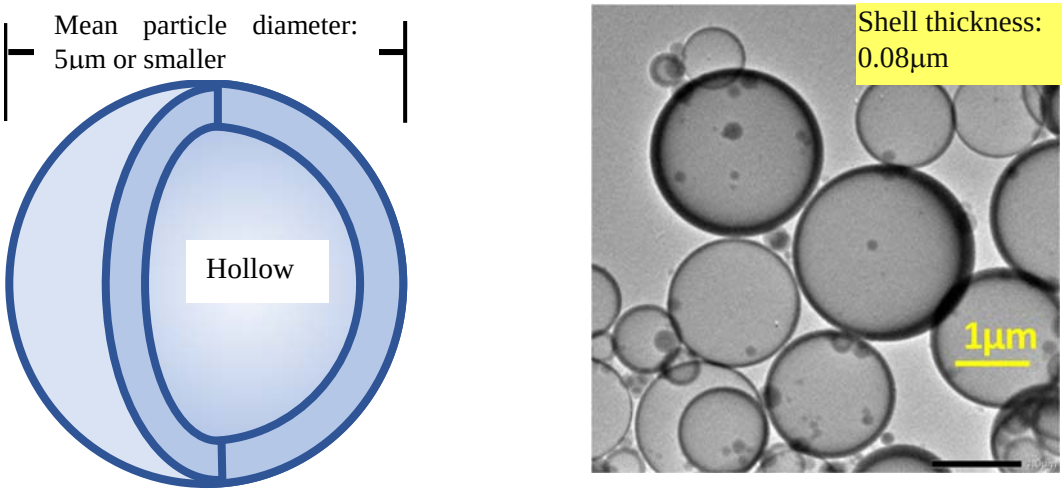


**Fig. 1. Image of CellSpheres™ particle (left) and image observed with electron microscope (right)**

**Table 1. Typical physical properties of CellSpheres™**

| Item | | Value |
|---|---|---|
| Mean particle diameter | [μm] | 4.0 |
| Void ratio | [%] | 75 |
| Particle density | [g/cm$^3$] | 0.6 |
| Compressive strength *1 | [MPa] | 15 |
| Relative permittivity*2 | [-] | 2.1 |
| Heat conductivity | [W/mK] | 0.033 |
| Melting point | [℃] | 700 |

*1 Powder pressurization method (at 50% survival)
*2 Cavity resonance perturbation method (1GH)