

February 4, 2020
Nippon Electric Glass Co., Ltd.

World's First Achievement*1: Development of Glass Beads that Realize Translucency of 3D Printed Models

Nippon Electric Glass Co., Ltd. (Head Office: Otsu, Shiga, Japan, President: Motoharu Matsumoto) has successfully developed glass beads for use as an additive in 3D printing materials that can adjust the translucency of 3D-printed models.

3D printers can form complex three-dimensional objects based on digital data without using molds. In particular, the stereo-lithography method, in which photocurable resins are hardened by laser beam, is widely used for many applications, such as prototypes of automotive, electrical and electronic parts, jewelry, and medical materials, due to its higher dimensional accuracy than other methods (such as selective laser sintering and fused deposition modeling).^{*2} Glass or ceramic beads have been used as an additive when printed models require higher heat resistance and strength. Such conventional additives do increase heat resistance and strength, but cannot accommodate printing translucent models because of mismatch of their refractive index with that of the resins, which causes light scattering.

Nippon Electric Glass has now developed glass beads whose refractive index matches that of resins used for 3D printing by making the best use of its many years of accumulated know-how in optical glass material design and bead manufacturing technologies. The new glass beads enable, for the first time in the world, printing of 3D models with translucency as well as heat resistance and strength.

[Product characteristics]

- **Translucency**

Translucent printed models is obtained by refractive index matched glass beads. The degree of translucency can also be varied by adjusting the proportion of this product with other additives.

- **Heat resistance and strength**

The heat resistance and strength of printed models increase by using this product.

- **Uniform dispersion**

Uniform dispersion in resins is achieved by optimizing the particle size of beads.

One typical application of this product is for temporary teeth. Such teeth made by adding conventional glass beads (without refractive index matching) look unnatural due to the lack of translucency. In contrast, teeth made with the new glass beads (with refractive index matching) look more natural with translucency close to real teeth, and have heat resistance and strength.

We began selling this product in January 2020. We aim to contribute to further development of 3D printing technology and associated market growth by providing glass beads that satisfy customers' needs.

*1: As 3D printed models with heat resistance, strength, and translucency.
 Surveyed by Nippon Electric Glass as of February 2020.

*2: Selective laser sintering: 3D printing method by using a laser to form models from ceramic or metal powder.

Fused deposition modeling: 3D printing method by extruding high-temperature molten resin from a nozzle and depositing it layer by layer.

[Photographs]

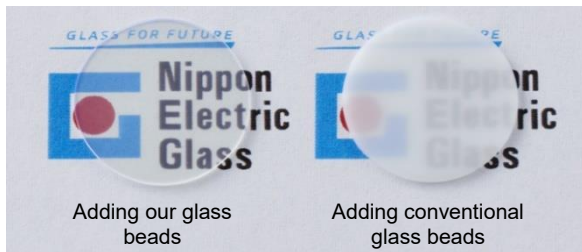


Our product

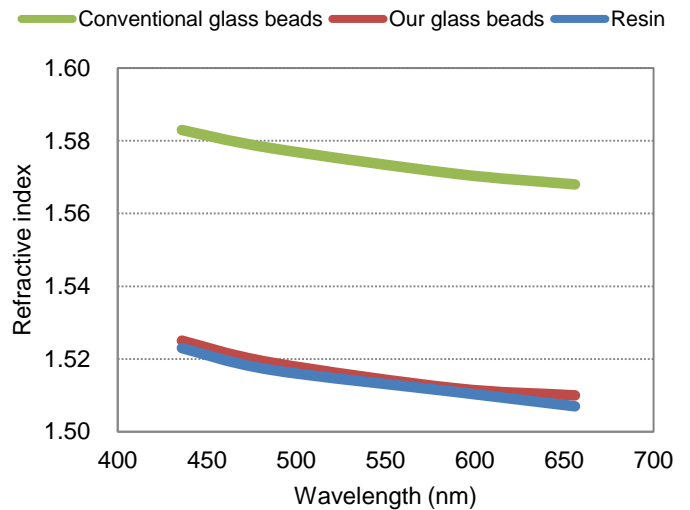


Temporary teeth using our product

[Comparison with conventional glass beads]



Appearance of 0.5mm-thick resin plates containing 30 vol% glass beads



Refractive indices of materials used for resin plates shown on the left