Exhibiting at THERMAL ENGINEERING 2015 at TECHNO-FRONTIER 2015

Nishimura Porcelain exhibited its power semiconductors and ceramic heat sink materials for electric vehicles (EV) at THERMAL ENGINEERING 2015, which was held at Makuhari Messe in May 2015. Power semiconductors reach high temperatures of 250°C or greater, so cooling methods (such as water and air cooling) and radiation parts are being explored. To that end, Nishimura Porcelain developed a heat sink material that uses radiation, leveraging the electrical insulation, heat conduction properties, and high-efficiency infrared ray radiation characteristics of ceramics at high temperatures. As EVs and other vehicles are increasingly being equipped with more electric devices, they tend to store heat inside, making heat countermeasures for devices and substrates a pressing matter. There are many cases in which cooling fans cannot be used due to space, electric power conservation, noise countermeasures, etc. Ceramic heat sinks, which are known for releasing heat via radiation, are drawing the attention of many electronic equipment and automobile manufacturers.

Company Profile - Key information (as of August 2015)

Established: 1918

- Exhibited at TECHNO-FRONTIER 2014 (THERMAL ENGINEERING 2015)
- Nishimura Porcelain was developed by utilizing the company’s original manufacturing techniques. Patents have been obtained in Japan and the United States for a radiation part ceramics manufacturing technology.
- This material has a crystalline particle diameter of several microns, which is extremely minute compared to general alumina. This particle structure is effective in radiating far-infrared rays at a high temperature. In contrast, general alumina ceramics limit the radiation performance of a radiation part. N-9H® alumina ceramics from Nishimura Porcelain were developed by utilizing the company’s original manufacturing techniques.
- There are many electronics, medical equipment, and precision equipment manufacturers in the Kansai area. Nishimura Porcelain is aiming to expand the market for the newly developed ceramic heat sink while cooperating with these corporations. It is also proactively involved in the Super Cluster Program that aims for the development and application of power superconductors—which is being undertaken by corporations and public experimental research institutions in the Kyoto region, centered on Kyoto University—and working to create results.

Development background

In a heater Nishimura Porcelain developed more than 20 years ago, a quartz tube was used as a cover to prevent radiation losses from being exposed. The quartz tube was switched to ceramics, which are transparent to far-infrared radiation, in order to heat with far-infrared rays. When applying the same electric power to both, a lower temperature was measured for ceramics than the quartz tube. Therefore, Nishimura Porcelain thought ceramics could be used for heating heating elements, including electronic parts.

Uniqueness

- Excellent thermal conductivity (approximately 2.5 times that of products on the market with the same area)
- Emissivity of 0.97 (0.85 or less with aluminum, 1 with an ideal blackbody)
- Voltage resistance of 30kV/mm or greater

Company history

- Founded as the private company of the late Masajiro Nishimura in Higashiyama-ku, Kyoto; 1918
- Nishimura Satoku Co., Ltd. was founded in Higashiyama-ku, Kyoto; with capital of 10,000 yen; 1947
- Chosen for the FY2012 Revised Manufacturing Small to Medium Enterprise Small-Scale Business Promotion Project Development, Commerce, and Service Innovation Project.
- Chosen for the FY2014 Revised Manufacturing Small to Medium Enterprise Small-Scale Business Promotion Project Development, etc. Support Subsidy Aid Project.
- Exhibited at TECHNO-FRONTIER 2015 (THERMAL ENGINEERING 2015)
- Nishimura Porcelain appointed as CEO; 2061
- Developed a high-heat-radiation ceramic substrate for LEDs (quartz acquired). This product was adopted (commercialized) for lighting equipment in Tokyo Skytree; 2012
- Nishimura Porcelain were developed by utilizing the company’s original manufacturing techniques. Patents have been obtained in Japan and the United States for a radiation part ceramics manufacturing technology.

FACT SHEET

N-9H® heat radiating ceramics

A ceramic heat sink that releases and transfers heat while insulating.

Feature 1

These alumina ceramics have a high-purity, minute, homogeneous structure with excellent crystal grains. Minute pores, etc., in the grain boundary, which impair phonon conduction, have been reduced as much as possible.

Feature 2

- Thermal conductivity of N-9H® is approximately twice that of products on the market with the same area.
- Emissivity of 0.97 (0.85 or less with aluminum, 1 with an ideal blackbody).
- Voltage resistance of 30kV/mm or greater.

Company Profile - Key information (as of August 2015)

Number of employees: 42
Capital: 491.14 million yen
Established: 1918
Representative CEO: Yoshihito Nishimura

Business areas

Manufacturing and selling industrial ceramic materials for electrical insulation parts, precision instrument parts, heat-resistant parts, etc.

NISHIMURA PORCELAIN CO., LTD.