Press Information

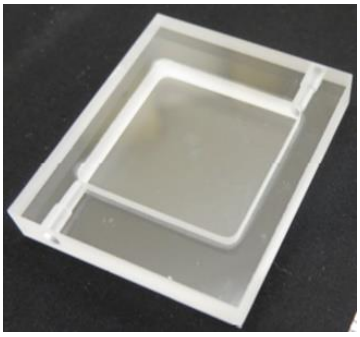
Kyocera's high quality 'sapphire' components support the fundamentals of electronics and fluid analysis

Sapphire bonding technology enables utilization of the material's chemical resistance, high strength, plasma resistance and translucence for usage in cutting-edge applications.

Kyoto/London, June 1st, 2021. With over six decades of experience in creating innovative materials and technology, Kyocera has developed a direct bonding technology which attaches sapphire to sapphire or sapphire to alumina. This enables manufacturing of products which exploit the advantageous properties of sapphire such as chemical resistance, high strength, plasma resistance and translucency, while providing design freedom to create structures enabling movement of electrons and fluids in them. These products are used in a variety of fields like semiconductor manufacturing, bio-fluid analysis and applied physics.

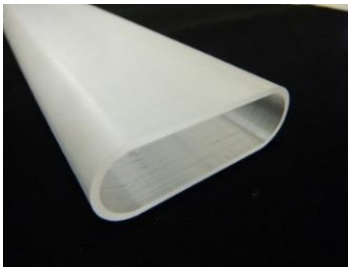
Examples of products produced with direct bonding

1. **Flow Cell**



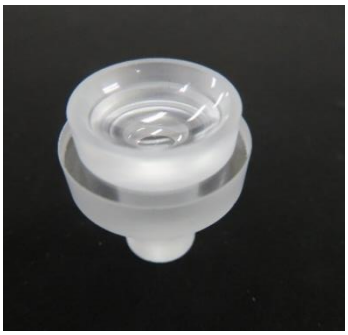
A flow cell is a structure with translucent channels that allow liquids and gases to pass through, while optically inspecting for impurities. The cells usually exposed to corrosive chemicals, so the usage of sapphire due to its high corrosion resistance property is recommended. Furthermore, the translucency of sapphire allows for the transmission of light, thereby enabling optical inspection of impurities. Such flow cells are used for particle inspection in the semiconductor cleaning process, specimen analysis of blood, molecular structure of fine substances etc.

2. **Tube**



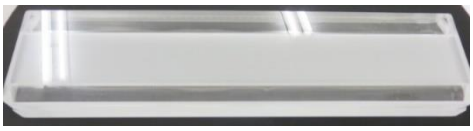
In analytical and semiconductor manufacturing equipment, an elliptical tube made of sapphire is used for enabling flow path of corrosive gases. Various gases can be used here, by taking advantage of the high corrosion resistance of sapphire. Furthermore, plasma can be generated directly in the tube by taking advantage of high insulation and low dielectric loss characteristics for high frequency.

3. Window



Owing to sapphire's translucency in a wide range of wavelengths from ultraviolet to infrared, it is suitable for making windows. As sapphire's strength is higher than other translucent materials, design flexibility to have thin windows is facilitated. Additionally, it can be used in various processes of semiconductor manufacturing and liquid crystal panel manufacturing, due to its plasma resistance and corrosion resistance.

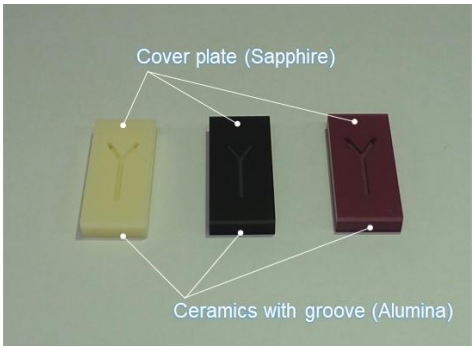
4. Electron Beam Waveguide

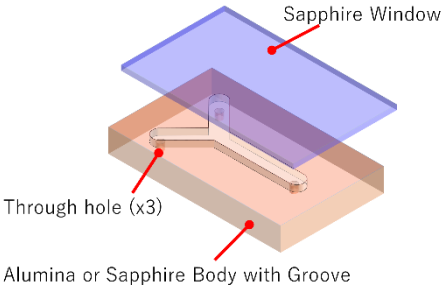


This product is a long plate with internal flow channel, and is used in electron accelerators. These long tubes can be formed using the sapphire bonding technology and are highly airtight so that they can be used in a vacuum. Electrodes can be placed on the periphery and used as accelerators for electron beams.

5. Microchannel

This product is formed by bonding a ceramic with an in-built channel and a sapphire cover plate. Shallow channels of several hundred nanometers can be formed on the ceramic. The product is used for reaction observations of liquid samples and analysis of trace substances. Due to the high corrosion resistance, this can be used for all chemicals. The flow path of the liquids can also be observed by designing the channel in the required shape.





For more information on Kyocera: www.kyocera.co.uk

About Kyocera

Headquartered in Kyoto, Japan, KYOCERA Corporation is one of the world's leading manufacturers of fine ceramic components for the technology industry. The strategically important divisions in the KYOCERA Group, which is comprised of 298 subsidiaries (as of March 31, 2020), are information and communications technologies, products which increase quality of life, and environmentally friendly products. The technology group is also one of the most experienced producers of smart energy systems worldwide, with more than 40 years of know-how in the industry.

The company is ranked #549 on Forbes magazine's 2020 "Global 2000" listing of the world's largest publicly traded companies. With a global workforce of over 75,500 employees, Kyocera posted sales revenue of approximately €13,33 billion in fiscal year 2019/2020. The products marketed by the company in Europe include printers, digital copying systems, semiconductor-, fine ceramic-, automotive- and electronic components as well as printing devices and ceramic kitchen products. The KYOCERA Group has two independent companies in the United Kingdom: KYOCERA Fineceramics Ltd. and KYOCERA Document Solutions Ltd.

The company also takes an active interest in cultural affairs. The Kyoto Prize, a prominent international award, is presented each year by the Inamori Foundation — established by Kyocera founder Dr. Kazuo Inamori — to individuals worldwide who have contributed significantly to the scientific, cultural, and spiritual betterment of humankind (converted at approximately €828,000 per prize category).

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