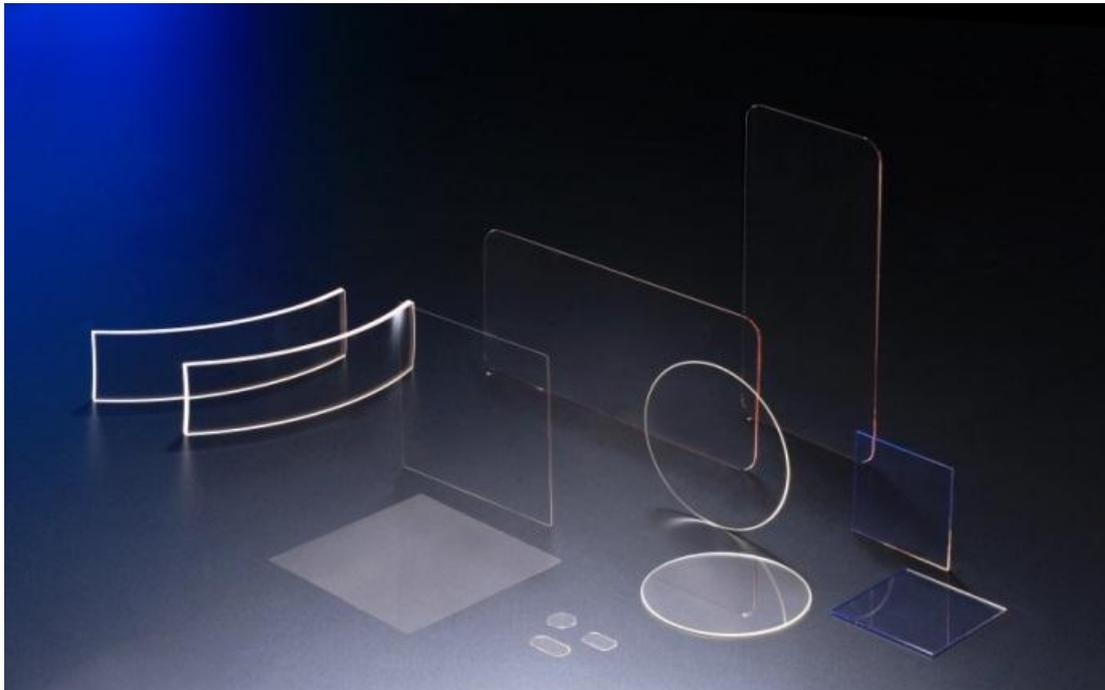


December, 2015

OHARA INC.

Shock Resistance and High Hardness Clear Glass Ceramics Has Released

It achieved outweighed properties in terms of shock resistance of chemically tempered glasses and fracture toughness of sapphire crystal glasses.



Ohara Incorporation, which is a leading company of optical glass production (headquarter locates in Sagami-hara-shi, Kanagawa, Japan, and CEO Hirokazu Saito), has launched to sell Clear Glass Ceramics which material has shock resistance and high hardness.

Clear Glass Ceramics is a material which has far greater shock resistance than chemically tempered glasses and hardness than sapphire crystal glass.

Applying our nanotechnology which has been fostered in the space and astronomy field, we succeeded to develop a glass ceramics with high transmittance.

It will make a contribution for the usage such as protectors for exchangeable single-lens reflex (DSLR) and cover plates for mobile device panels which need high shock resistance.

[Characteristics]

Shock Resistance Property and High Hardness

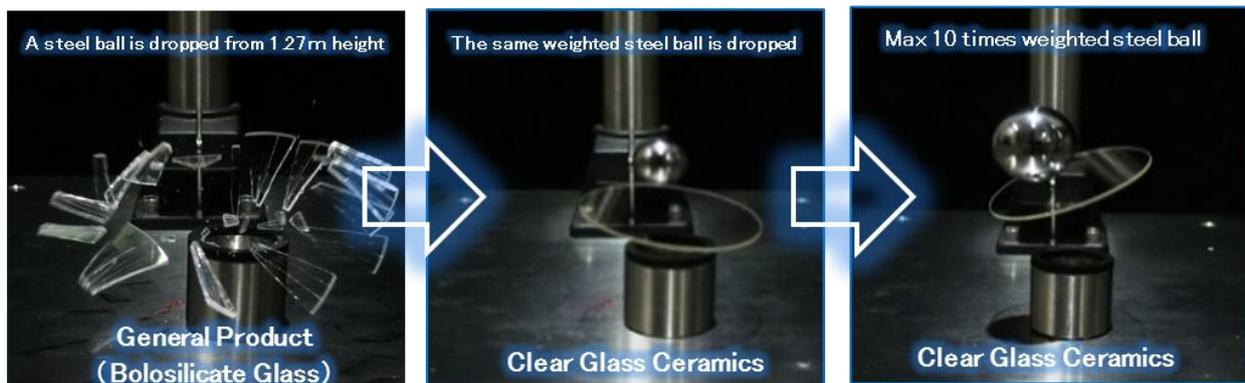
Comparing to general borosilicate glasses, clear glass ceramics hardness is improved by 30%, shock resistance shows more than ten times by falling steel ball impact test; moreover, its hardness is improved by 20%, shock resistance shows more than three times by falling steel ball impact test compared to chemically tempered glasses.

In addition, its fracture toughness is superior to sapphire crystal glasses. Thus, cracks which could cause fractures does not occur even it scratched, and property of material tenaciousness and break-proof is developed.

① **Picture of Falling Impact Test (Shock Resistance Property Test)**

It is compared to general borosilicate glasses which are used for optical usages.

Clear glass ceramics does not be broken even though max 10 times weighted steel ball is dropped from 1.27 meter height.



② **Vickers Hardness Test**

Cracks which could cause fractures do not occur. Superiority of clear glass ceramics is confirmed.



(Pictures when diamond intender is indented at 500gf load according to Vickers Hardness Test.)

※Vickers hardness is one of the weight scale and one of the indentation hardness. A rigid-body (intender) which is made with diamond is indented to the device under test, and the indentation size is used to judge the hardness.

1 . High Transmittance which Other Glass Ceramics Have Never Achieved

In general, glass ceramics have larger crystal particles which cause low transmittance and are not usable for optical applications. OHARA's nanotechnology (approx.. particle diameter: 6nm) developed in the space and astronomy field achieved high-transmittance, and clear glass ceramics has been qualified to be used in protectors for exchangeable DSLR which requires rigorous optical specifications and quality accuracy (new product from Sigma).

2 . Good Machinability

OHARA succeeded to obtain the same machinability level as glasses, maintaining tough ceramic property, and the processing time to be twentieth of that of sapphire crystal glass.

【Applications】

- Mobile devices (Smart phones, Tablets, and other gadgets IT electrical products)
- Automotive (Electrical equipment and instrumental panels and other accessories)
- Medical devices (Device for medical examination, surgery, and portable terminals)
- Photographing tools (Protector for exchangeable lens, security cameras, camera for underwater)
- Other equipment use in severe environment (open air, constructions, investigations, industrials).

【Introduction of Company】

Since foundation in 1935, OHARA is a leading company of optical glass industry and supplies glasses for many kinds of optical components such as DSLR camera. OHARA's glass is also used as a key part for semiconductor/liquid crystal lithography and substrates for hard disks including the space and astronomy field. OHARA's glass ceramics is qualified for primary mirror for TMT which will be the largest telescope in the world, and our technology has been introduced by many kinds of media.

【Company Outline】

Name of Company	OHARA INC.
Address	15-30, Oyama 1-chome, Chuo-Ku, Sagamihara-Shi, Kanagawa 252-5286, Japan
President	Hirokazu Saito
Business lineup	Optical glass/Special glass manufacturing and sales
Capital found	5,855 million yen
Number of Employees	430
TEL	042-772-2101
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MAIL	sale@ohara-inc.co.jp
URL	http://www.ohara-inc.co.jp/jp/index.html

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