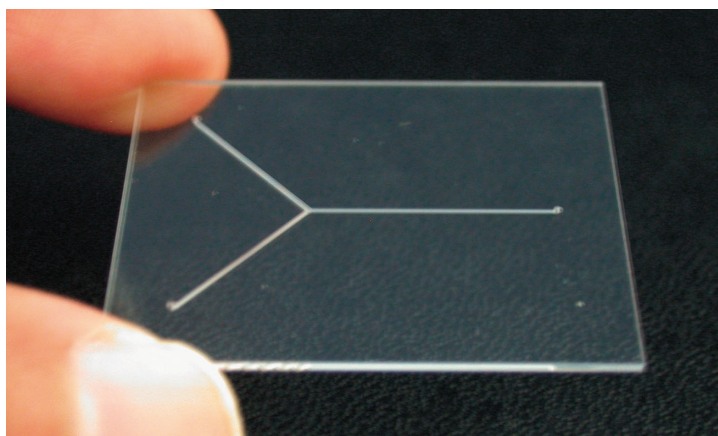


**Shin-Etsu Synthetic Quartz**

# Synthetic Quartz Glass Substrates for Micro-chips and Bio-chips

**VIOSIL-SQ** (For General Application)**VIOSIL-SX** (For High Temperature Application)

In recent years, companies are focusing on development of micro-devices featuring semiconductors, MEMS and nanotechnology. These devices are used for study and analysis in the biotech and environmental fields. We recommend our synthetic quartz for microchemical plant ( $\mu$ -TAS, lab-on-a-chip, chemical IC, etc.). They feature integrated pumps, valves, injectors, reactors and separators.

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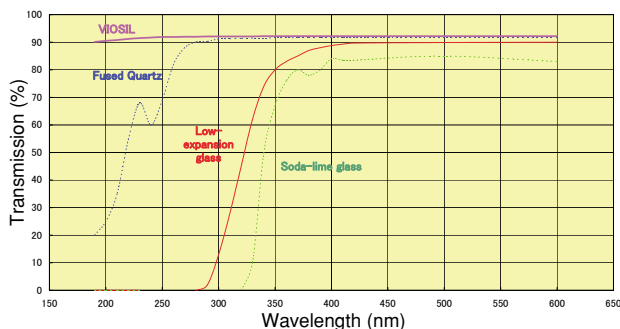
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## 1 Features

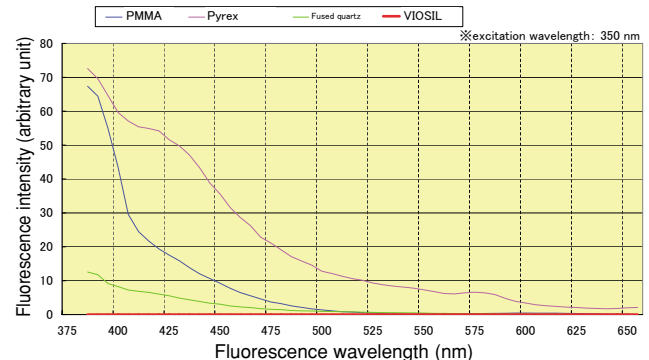
- Transmissivity: high transmissivity in the range from visible light to far UV, convenient for UV absorptiometric analysis.
- Non-fluorescence: non-fluorescence in excitation wavelengths from visible light to far UV.
- Low birefringence: birefringence low enough for use for polarization.
- OH-groups: stable electrophoresis and electroosmotic flow properties by control of surface OH concentration.
- Purity: high-purity synthetic quartz is used, so chips can be used for precision experiments and analysis with no risk of contamination.
- Cleanliness: products can be shipped with a high standard of cleanliness equal to that of semiconductor manufacturing.
- High heat-resistance & mechanical strength: chips can be reused over years, translating to reduced costs.
- Defects: using photomask manufacturing technology, we can produce glass chips that have an incidence of surface defects as low as that of semiconductors.
- Micro-roughness: very low surface roughness makes effective bonding possible.
- Flatness: photomask technology results in high flatness and low warping.

## 2 Physical Characteristic

### Transmission Curve

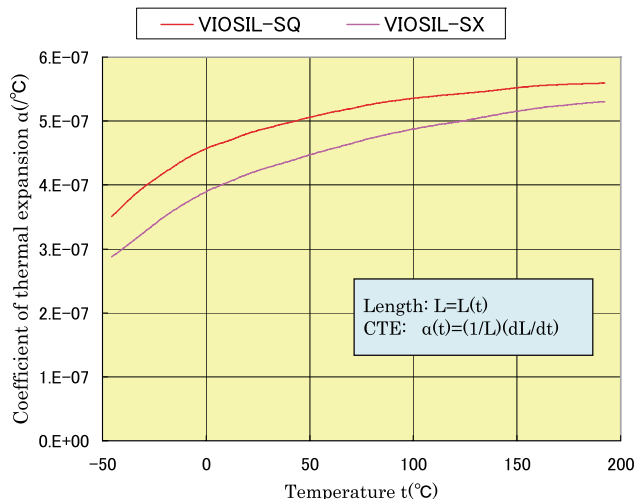


### Fluorescent Intensity



## 3 Miscellaneous Properties

### Thermal Expansion

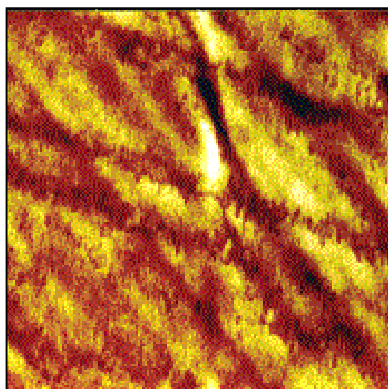


### Mechanical Properties

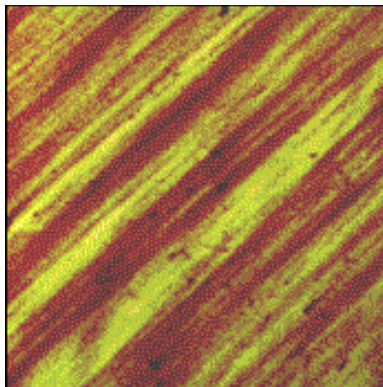
Mechanical Properties	unit	VIOSIL-SQ	VIOSIL-SX
specific gravity ( $\rho$ )	$\text{g/cm}^3$	2.20	2.20
Poisson's ratio ( $\sigma$ )		0.17	0.17
Young's modulus (E)	$\text{kg/mm}^2$	7450	7450
shear modulus (G)	$\text{kg/mm}^2$	3160	3160
Vicker's hardness ( $H_v$ )	$\text{kg/mm}^2$	790	790

## 4 Polished Surface of Substrate (Micro Roughness)

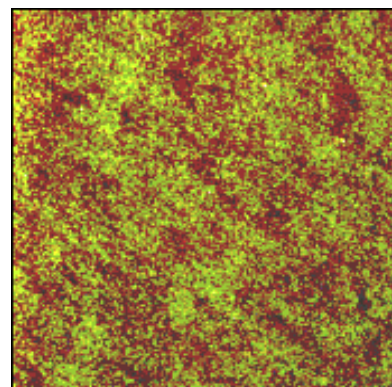
P-grade ( $Ra \leq 1.0$  nm)



W-grade ( $Ra \leq 0.3$  nm)



S-grade ( $Ra \leq 0.2$  nm)



Measured with AFM (Atomic Force Microscope),  $1\mu m^2$  area.

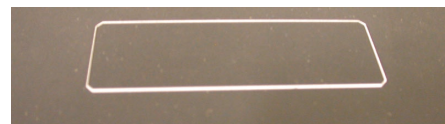
## 5 Processing

Shin-Etsu can process the surface of quartz substrates, such as surface treatment, hole processing, micro channel processing, etc.

### ● Surface Treatment

Shin-Etsu can treat quartz glass surface with silane coupling agents to make the surface hydrophobic or chemically functional. These treated surfaces can be used for DNA chips, microfluidic chips and other applications.

(Shin-Etsu produces a variety of silane coupling agents as part of our lineup of carbon functional silanes.)

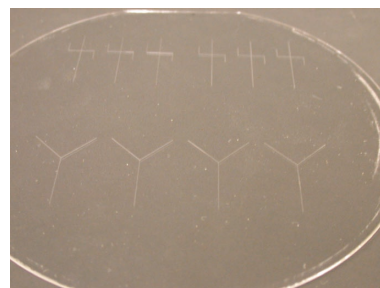
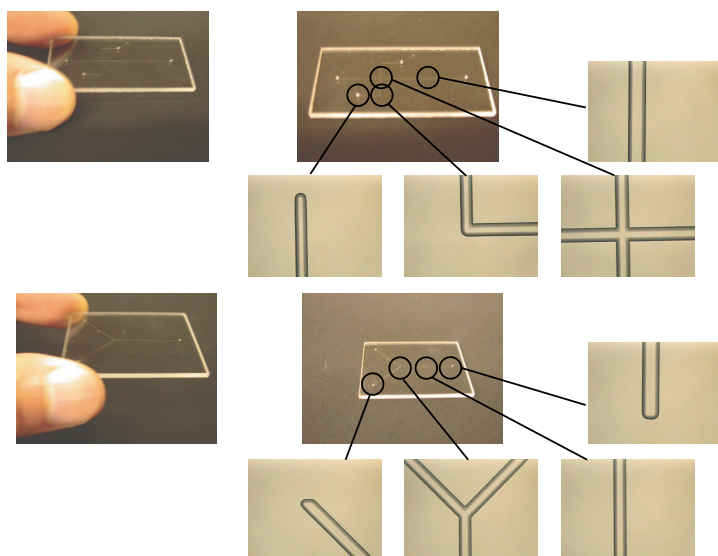


### ● Hole Processing and Disk Manufacturing

Shin-Etsu can process holes through quartz glass substrates and also manufacture circular disks with holes concentric to the edge.

### ● Micro Channel Processing

Shin-Etsu can manufacture chips with micro channels using drilling techniques and the same lithography technology used in semiconductor manufacturing.



※ (Example) The above Micro channel: width x depth=50×20μm

**Shin-Etsu**

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