

# Presentation of toxic elements - free Chalcogenide Glasses (IIR series)

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## ABSTRACT HEADING

IIR-SF1 is a chalcogenide glass that does not contain harmful substances such as Arsenic (As) and Selenium (Se), and IIR-SF2 does not contain Germanium (Ge). IIR series has a wide transmission range in the infrared region, and these have excellent moldability and can be molded into various shapes (lenses, etc.).

## INTRODUCTION

Chalcogenide glasses have excellent transmission in the infrared region and have been the most promising candidates for applications in infrared optics for a long time. Among them, selenide glasses one of the chalcogenide glasses systems, such as Ge - Se, Ge - As - Se and Ge - Sb - Se glasses [1], have been developed for commercial applications. However, these chalcogenide glasses contain toxic elements such as Arsenic (As) and Selenium (Se), which poses a problem in processing such as optical polishing. IIR series is As and Se - free chalcogenide glass. IIR-SF1 is Ge - Sb - Sn - S system [2] and IIR-SF2 is Ga - Sb - Sn - S system [3] [4]. This glass system have a good glass-forming ability and also exhibit high chemical durability.

This report is the optical properties and moldability of the IIR series.

## OPTICAL PROPERTIES

### IR Transmittance

Fig. 1 shows the transmittance and internal transmittance of the IIR series.

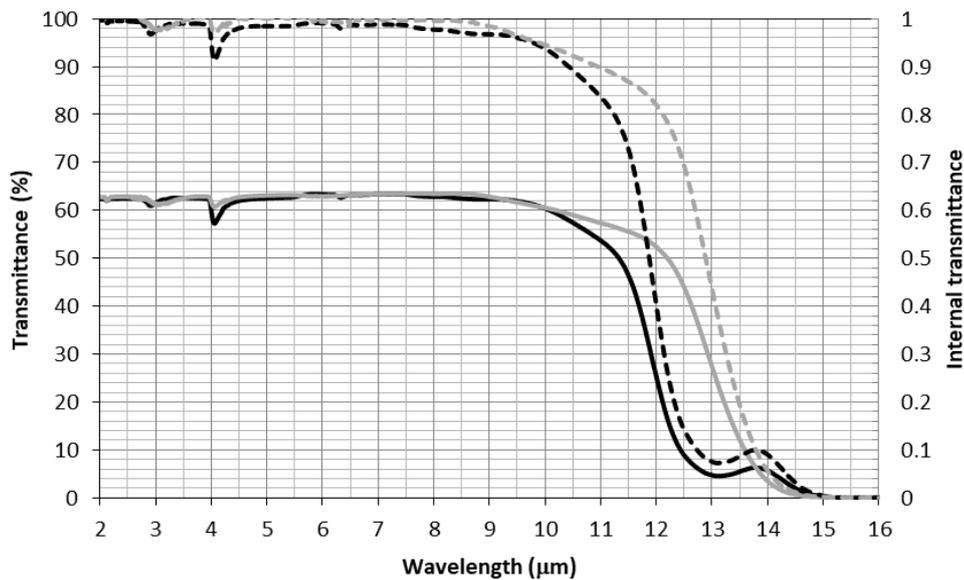


Fig.1. Transmittance (solid line) and internal transmittance (dotted line) of IIR-SF1 (black line) and IIR-SF2 (gray line).

The transmission range of the IIR series is 11 to 12 μm. IIR-SF1 has a shorter transmission range than IIR-SF2. This is because there is absorption of Ge-O near 12 μm.

### Refractive Index

Fig. 2 shows the refractive index of the IIR series.

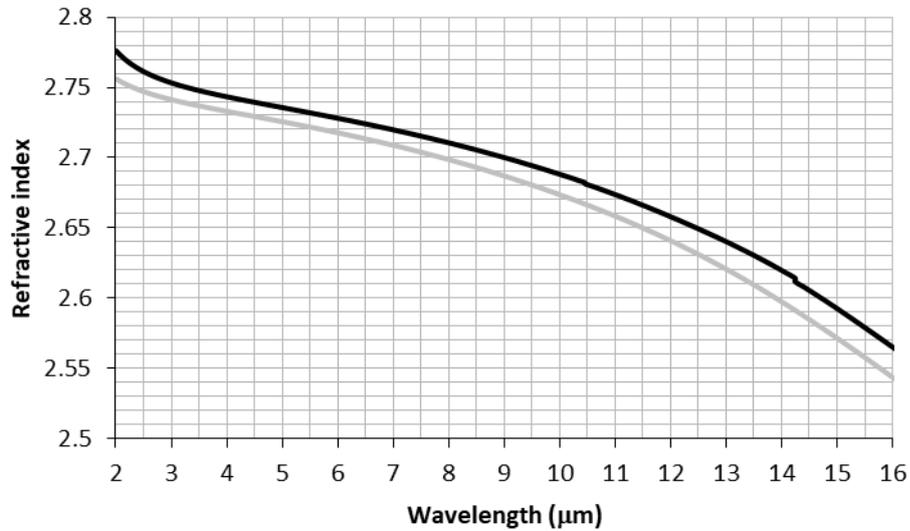


Fig.2. Refractive index of IIR-SF1 (black line) and IIR-SF2 (gray line).

Refractive index is 2.68 (IIR-SF1) and 2.66 (IIR-SF2) at 10.6 μm

#### MOLDABILITY

Fig. 3 shows the molded products of IIR series. IIR series can be easily processed into various shapes.

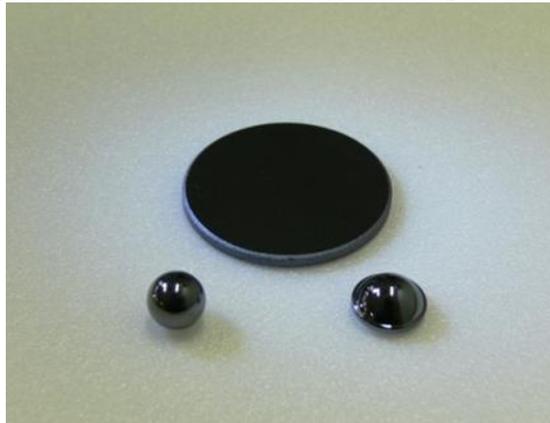


Fig. 3 Products of IIR series

#### ACKNOWLEDGMENTS

IIR-SF2 is the result of the intellectual property of Kyoto Institute of Technology.

#### REFERENCES

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[https://www.us.schott.com/advanced\\_optics/english/products/optical-materials/ir-materials/infrared-chalcogenide-glasses/index.html?wss\\_setorigin=1&wss\\_iso=en-US](https://www.us.schott.com/advanced_optics/english/products/optical-materials/ir-materials/infrared-chalcogenide-glasses/index.html?wss_setorigin=1&wss_iso=en-US)
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#### KEY WORDS

Chalcogenide glass, Sulfide glass, Non-oxide glass, Toxic elements – free, IR transmission materials, Glass molding;