Magnesium Oxide
MgO

🔷 Key Properties of Magnesium Oxide (MgO)

🌈 Broad IR Transmission: Transparent from ~0.3 µm to 7 µm, ideal for visible, near-IR, and mid-IR systems.
🔍 Moderate Refractive Index: ~1.72 at 1 µm, offering good optical clarity for IR windows and imaging optics.
🧪 Chemically Inert: Excellent resistance to moisture, corrosion, and chemical attack — far superior to hygroscopic salts like NaCl and KBr.
🔥 High Thermal Stability: Exceptional resistance to heat and thermal shock, making it ideal for furnace viewports and high-temperature optical systems.
🪨 Mechanically Strong: Hard, abrasion-resistant, and suitable for rugged industrial and scientific environments.
⚡ IR Laser Compatible: Suitable for CO_2 laser systems and other high-power IR applications requiring durable window materials.
🛰️ Stable in Harsh Conditions: Performs reliably in extreme environments, including high-temperature, high-radiation, and corrosive settings.

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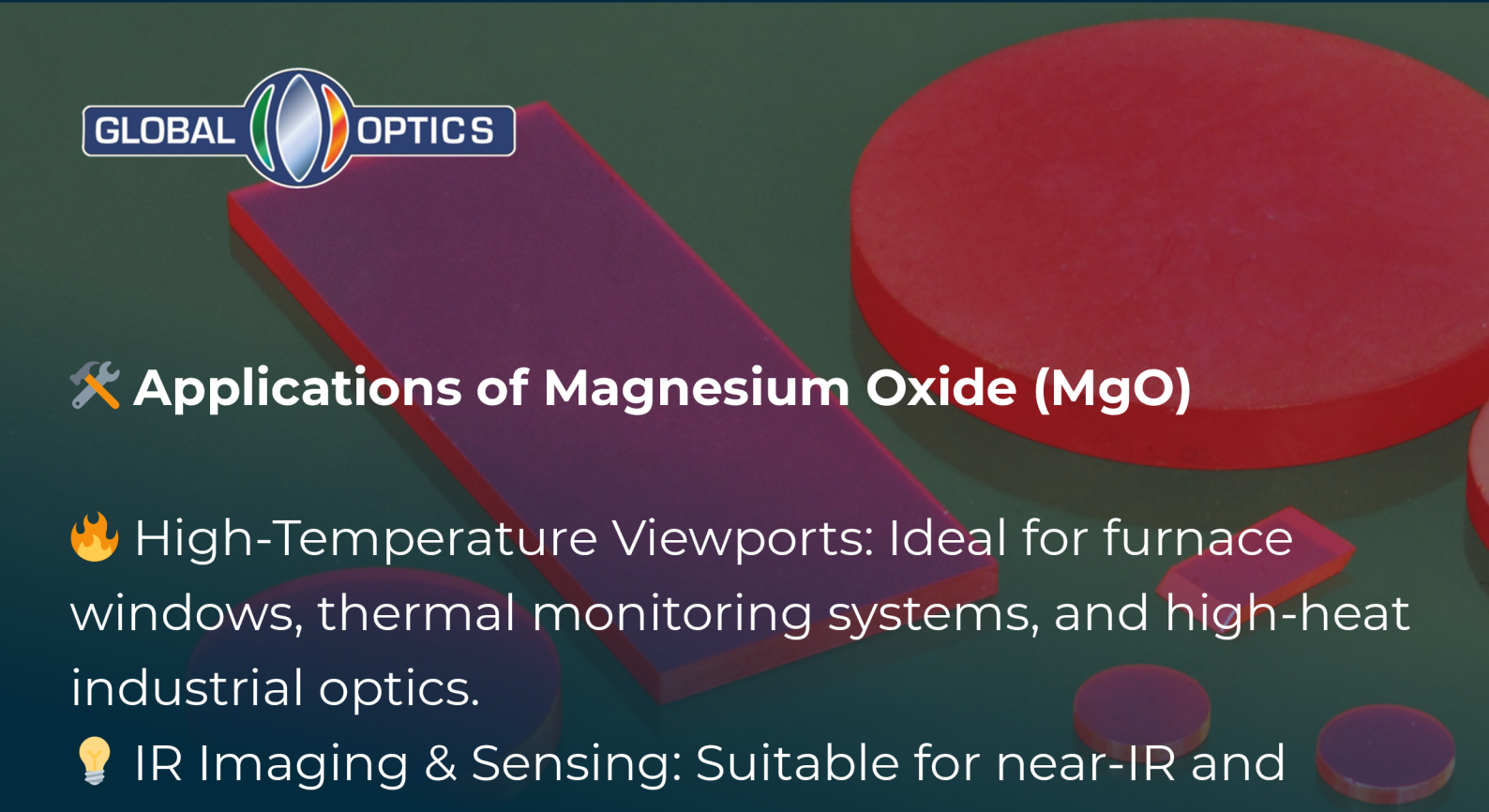

🛠️ Applications of Magnesium Oxide (MgO)

🔥 High-Temperature Viewports: Ideal for furnace windows, thermal monitoring systems, and high-heat industrial optics.
💡 IR Imaging & Sensing: Suitable for near-IR and mid-IR instruments thanks to broad 0.3–7 µm transmission.
⚡ CO_2 Laser & IR Laser Optics: Performs well under high-power IR laser exposure, especially at 10.6 µm.
🧪 Chemically Harsh Environments: Highly resistant to corrosion, moisture, and chemical attack in demanding industrial settings.
🛰️ Aerospace & High-Radiation Optics: Stable under radiation and extreme environmental conditions.
🪨 Protective IR Windows: Used for rugged IR covers, inspection ports, and protective barriers in scientific and industrial systems.

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Technical Parameters of Magnesium Fluoride (MgF_2)

Property	Typical Value
Transmission Range	0.30 µm – 7.0 µm
Refractive Index	1.72 @ 1 µm
Density	3.58 g/cm³
Melting Point	2852 °C
Hardness (Knoop)	~700 kg/mm² (very hard)
Thermal Expansion	~13 × 10^{-6} /°C
Crystal Type	Cubic (single crystal)
Hygroscopic	No
Chemical Formula	MgO
Applications	IR windows, furnace viewports, CO_2 laser optics, harsh-environment sensors, high-temperature systems

Magnesium Oxide (MgO) is a highly durable infrared optical material with strong transmission from 0.3–7.0 µm, making it ideal for high-temperature viewports, thermal imaging systems, CO_2 laser applications, industrial sensors, and optical platforms operating in harsh environments.

It has a moderate refractive index (~1.72), low dispersion, and is non-hygroscopic, providing excellent environmental and chemical stability compared with hygroscopic salts like NaCl or KBr. As a hard, thermally robust, and corrosion-resistant crystal, MgO can be fabricated into IR windows, prisms, protective viewports, and high-heat optical components, maintaining reliable performance under demanding industrial and scientific conditions.

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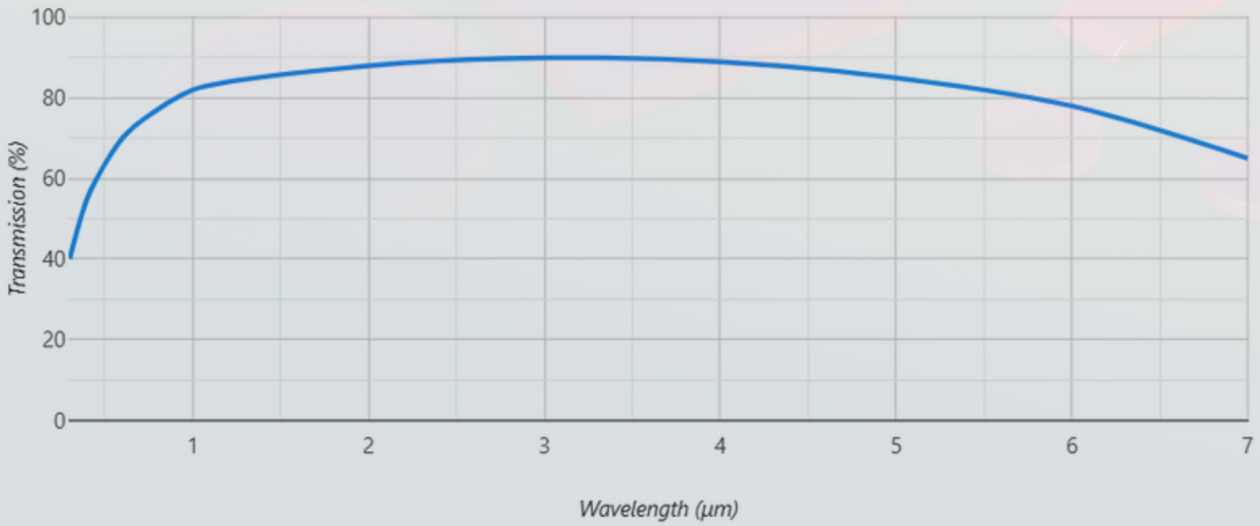
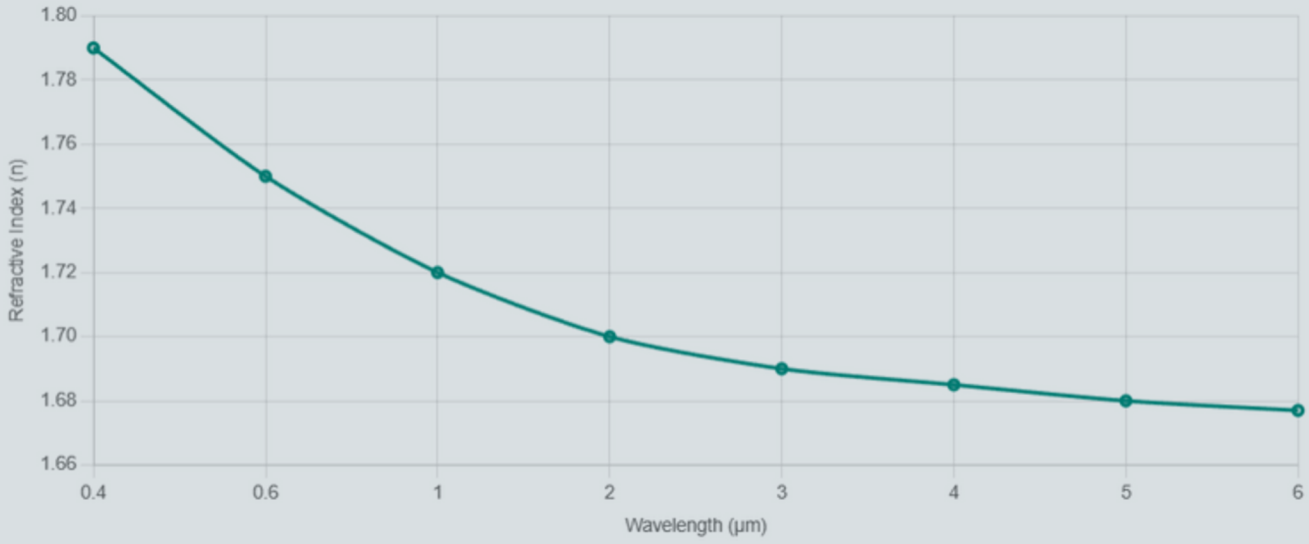
Magnesium Oxide (MgO) – Optical & Thermal Graphs

MgO Transmission (0.30–7.0 µm)



MgO Refractive Index



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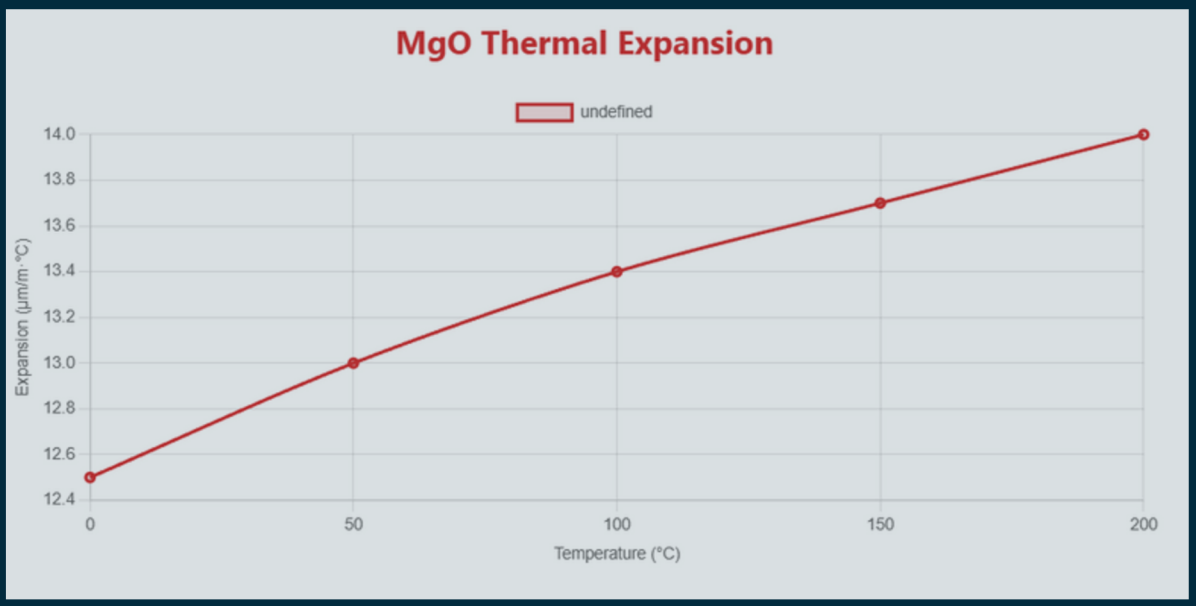
Magnesium Oxide (MgO) provides strong transmission from 0.30 µm to 7.0 µm, covering the visible, near-infrared, and mid-infrared regions. With its moderate refractive index (~1.72) and low dispersion, MgO is well suited for IR imaging systems, CO_2 laser applications, high-temperature viewports, and broadband IR windows and optical components.

MgO offers excellent thermal stability and maintains reliable optical performance in demanding laboratory and industrial environments. As a hard, chemically inert, and thermally robust material, it can be fabricated to high precision for IR windows, protective viewports, prisms, and other components used in high-heat or corrosive conditions.
Being non-hygroscopic and chemically stable, MgO is easy to handle and remains a dependable choice for industrial IR optics, high-temperature systems, laser platforms, and harsh-environment infrared applications.



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FAQ

Q: What is Magnesium Oxide (MgO) used for?
A: Magnesium Oxide is widely used for high-temperature viewports, IR imaging, thermal monitoring systems, CO_2 laser optics, and harsh-environment industrial windows, thanks to its broad 0.3–7 µm transmission and exceptional heat resistance.

Q: What makes MgO different from other infrared materials?
A: MgO is exceptionally thermally stable, chemically inert, and mechanically strong, outperforming hygroscopic salts such as NaCl and KBr. It also offers good mid-IR transparency, resistance to corrosion, and excellent thermal-shock durability.

Q: Is Magnesium Oxide hygroscopic?
A: No. MgO is non-hygroscopic, meaning it does not absorb moisture and remains stable in humid, outdoor, and chemically aggressive environments.

Q: Is MgO suitable for high-power IR and CO_2 lasers?
A: Yes. MgO performs well in CO_2 laser systems (10.6 µm) and other high-power IR setups due to its excellent heat tolerance and mechanical robustness.

Q: What types of optical components can be made from MgO?
A: MgO is commonly fabricated into IR windows, protective viewports, prisms, inspection ports, and industrial optical components designed for high-temperature or corrosive environments.

Q: How durable is Magnesium Oxide?
A: MgO is extremely durable — offering high hardness, abrasion resistance, and strong chemical and thermal resilience. It is well-suited for demanding industrial, aerospace, and scientific applications.

Q: Can MgO optics be anti-reflection coated?
A: Yes. MgO components can be supplied uncoated or with IR anti-reflective and high-temperature protective coatings, depending on the application.

Q: Is MgO safe to handle?
A: Yes. MgO is non-toxic, chemically stable, and safe to handle with standard optical precautions (gloves, clean handling environment)

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