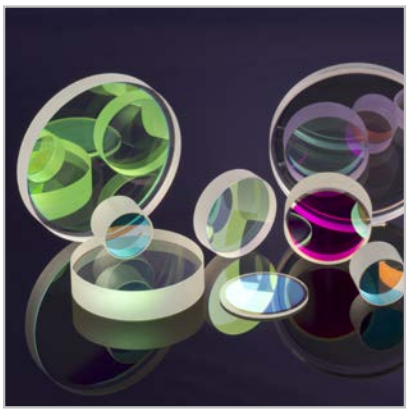
Laser Optics for IR Wavelengths

For the Highest Energy Densities in the Laser Cavity

Kidney stones are effectively shattered using shock waves. These shock waves are being created more and more with the help of laser systems (i.e., with lasers that emit in the mid-IR range between 2 µm and 3 µm, the two absorption wavelengths of water).

Our coated laser optics can be found in the cavity of many medical laser systems. As the quality and performance of these systems continue to increase, the components on the inside of these systems must also improve. Large pulse energies in these lasers require excellent damage thresholds of the laser optic coatings. High absorption rates of water and OH groups demand coating systems that are void of water molecules and selected substrate materials, such as for example sapphire or Infrasil®.

Know-how is required to manufacture coatings in the mid-infrared wavelength range (i.e., the wavelength range that meets medical requirements). We have used ion beam sputtering (IBS) technology for this purpose with great success.



IR laser optics for lasers with infrared wavelengths.

IBS Coatings – Low Dispersion & Stable

To produce IBS coatings, ions are accelerated in precious gas plasma at high energy toward a target. Highly-pure, dielectric material is thereby atomized and then condensed on the surface of the substrate. This method can be controlled so exactly that the desired optical properties can be precisely achieved.

Dispersion of the layers is extremely low. The layers have a high density and a low microroughness. The absorption is barely measurable. Stable when confronted with chemicals, moisture can barely penetrate the coating.

To reproduce the coating, a computer-controlled system records the growth of the layers and regulates the coating unit fully automatically.

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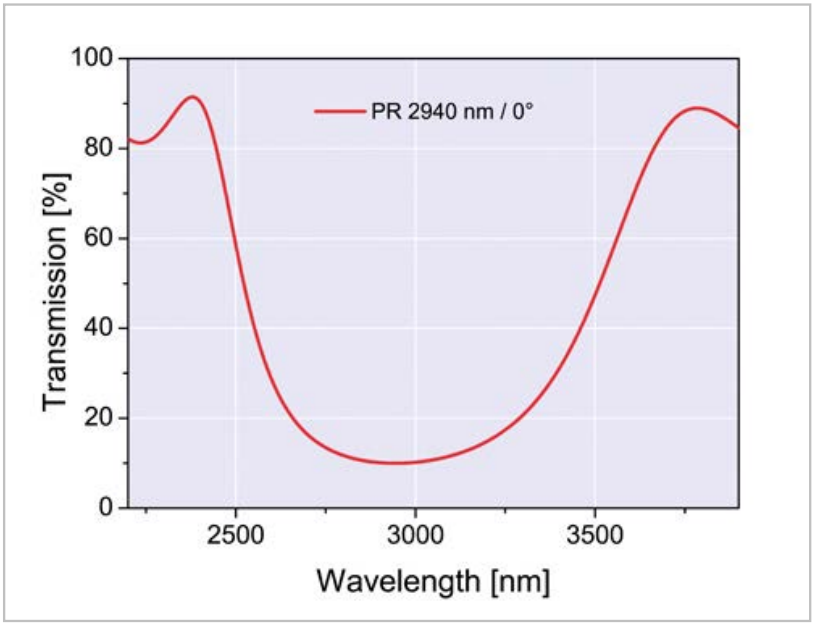
Damage Threshold Ten Times Higher

The graph shows the transmission curve of a sapphire output coupler for Er:YAG lasers. The coating has a reflection rate of R = 90% on the front side and an AR coating for L = 2.94 µm on the back side. Customer measurements confirm an improved damage threshold that is ten times higher than in a conventional e-beam coating!



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