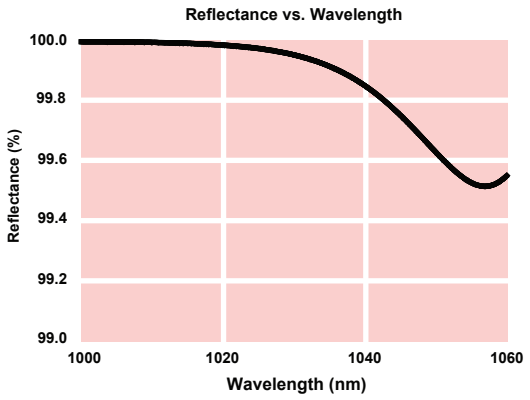
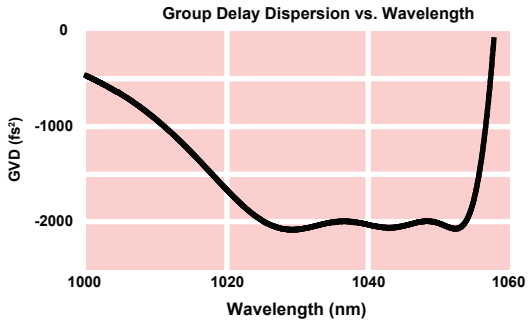
Negative Dispersion Mirrors for Ultrafast Lasers

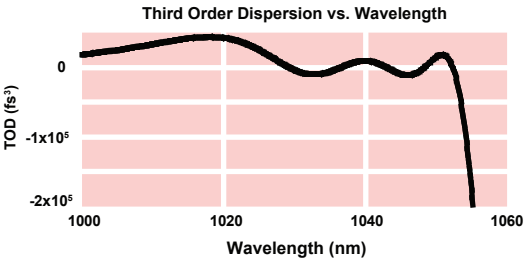
These negative Group Delay Dispersion (GDD) mirrors are optimized for use with ultrafast lasers having output in the visible or near infrared spectrum. These mirrors can be designed to deliver GDD values as high as -5000 fs^2 (with an accuracy ±10%) at the specific laser wavelength, while also offering excellent reflectivity (>99.8%) as well as high laser damage threshold. Together, these characteristics make these mirrors ideal for intra-cavity use in order to balance out self-phase modulation, and correct for the residual net dispersion due to other components in the laser cavity, including mirrors, windows and crystals. They are also well-suited for use in extra-cavity applications, such as for turning mirrors and in pulse compression systems.

Producing GDD correction optics requires thin film coating with a high degree of precision and repeatability in terms of layer thickness and refractive index, deposited on to extremely low scatter optical surfaces. REO employs our own enhanced superpolishing techniques to routinely achieve microroughness levels below 0.5 Å, resulting in a scattering loss of less than 5 ppm. These substrates are coated using ion beam sputtering (IBS) equipped with REO's proprietary deposition monitoring technology to yield unsurpassed layer precision and low absorption.

REO negative GDD mirrors are typically supplied on fused silica substrates, in diameters of up to 3 inches, with a flatness of λ/20 (at 633 nm), a surface quality of 10-5 over an 80% clear aperture, and zero defects (0-0) achievable over controlled sub-apertures. Nominal incidence angles anywhere in the 0° to 45° range can be accommodated. REO can also produce GDD compensating mirrors with a wide range of specifications on a custom basis.







Typical Specifications

Substrate Material	Fused Silica
Design wavelength range	450 nm to 1300 nm
Reflectivity	99.8%
Angle of incidence	Any angle over the 0° to 45° range
Surface Roughness	1 Å
Surface flatness (@ 633 nm)	λ/20
Surface quality	10-5 or better
Size range	0.25" to 3"
Clear Aperture	90%

The spectral range, group dispersion delay and third order dispersion characteristics of each REO negative dispersion compensating mirror are custom designed to meet the exact needs of specific application. The graphs shown here are provided as an example of the kind of performance that can be achieved for a specific use. In this case, the optic is a high reflector with a center wavelength of 1030 nm, and the desired GDD is -2000 fs^2.