UltraFast Innovations

YOUR KEY to innovation and success

Application note: broadband low dispersion dielectric high reflector

Recent years have seen continuous development of high-intensity ultrafast laser systems, stipulated by cutting edge applications such as high harmonic generation, laser particle acceleration and attosecond physics. However, a demand for ever increasing output power and ever shortening pulse duration puts a severe strain on all the building blocks of the relevant systems in the form of the requirements for high thermal and laser induced damage thresholds (LIDT). As systematic study in [1] shows, one of the most sensitive blocks to be beam steering mirrors for transportation of few-cycle laser pulses at high average power.

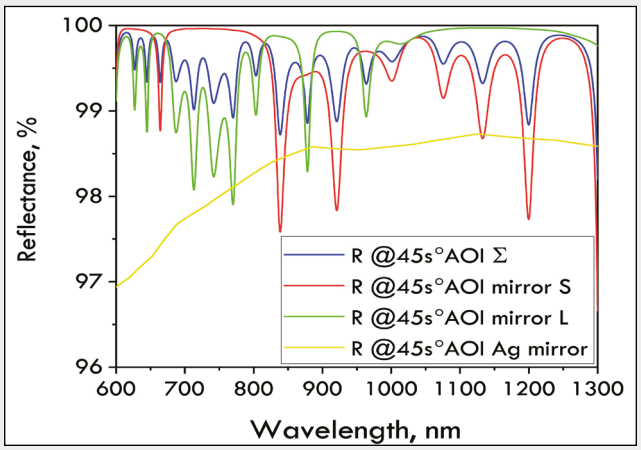
Due to a large spectral bandwidth of the few-cycle pulses, ultrabroadband optics with high reflectance and zero dispersion is required in order to efficiently transport few-cycle pulses. Metal-coated mirrors seem to be an excellent option. However, due to their lower reflectance a nonnegligible part of the incident power is absorbed by the mirror, thus substantially decreasing LIDT and causing beam deformations by the thermal load. Both effects limit usability of the metal mirrors in high average power ultrafast systems.

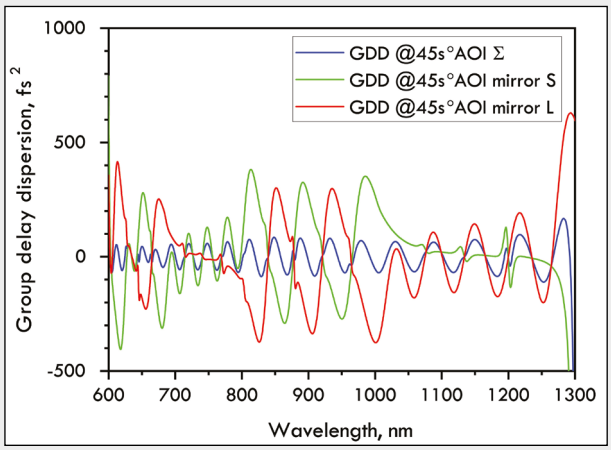
Dielectric mirrors have typically much higher reflectivity and, consequently, substantially higher LIDT. Yet they have to be carefully designed and produced in order to have well-controlled low dispersion. This is possible by development of a broadband low dispersion complimentary pair.

Ultrafast Innovations GmbH introduces newly developed low dispersion ultrabroadband dielectric high reflector complimentary pair PC2018.

PC2018 Design Features:

- **Spectral coverage from 600nm to 1300nm**
- **Averaged reflectance @45° AOI s-pol > 99 %**
- **0fs² averaged GDD @45° AOI s-pol**
- **Two fold increase of LIDT in comparison to metal-coated mirrors**





References:

[1] S. Hädrich, et al., "Scalability of components for kW-level average power few-cycle lasers," Applied Optics **55**(7), 1636 (2016).

UltraFast Innovations GmbH
Am Coulombwall 1
85748 Garching
Germany

tel. +49 89 36039 - 437
fax. +49 89 36039 - 453
info@ultrafast-innovations.com
www.ultrafast-innovations.com

UltraFast Innovations is a spin-off from the LMU Munich and the Max Planck Society.