

MIIPS® application notes

Can you trust your mirrors without MIIPS®?

Broadband dielectric coatings can wreak havoc on ultrafast pulses unless you have a MIIPS pulse shaper or you use MIIPS Certified Ultrafast Optics

Broadband mirrors are widely used in ultrafast laser setup because of their high reflectivity over a broad range of wavelength. However, most of such broadband mirrors, especially those with dielectric coatings, are not dispersion-free in the range of high reflectivity. Fig.1(a) shows the dispersion measurements of a broadband mirror. Three sharp changes in dispersion can be clearly seen from the figure, therefore, such mirror alone will cause a 15-fs laser pulse to be distorted to a pulse spanning over 300 fs as shown in Fig.1(c). Such dispersion will affect any nonlinear spectroscopy and microscopy, as shown in Fig.1(b), using second harmonic spectra as an example. Fortunately, multiphoton intrapulse interference phase scan (MIIPS®) provides adaptive measurement and correction of nonlinear dispersion. MIIPS® can accurately measure the dispersion from any ultrafast mirrors and compensate such dispersion. As shown in Fig. 1(d), the distorted pulse shown in Fig 1(c) was successfully compressed back to a 15-fs Gaussian pulse by MIIPS®, as a transform-limited pulse should be.

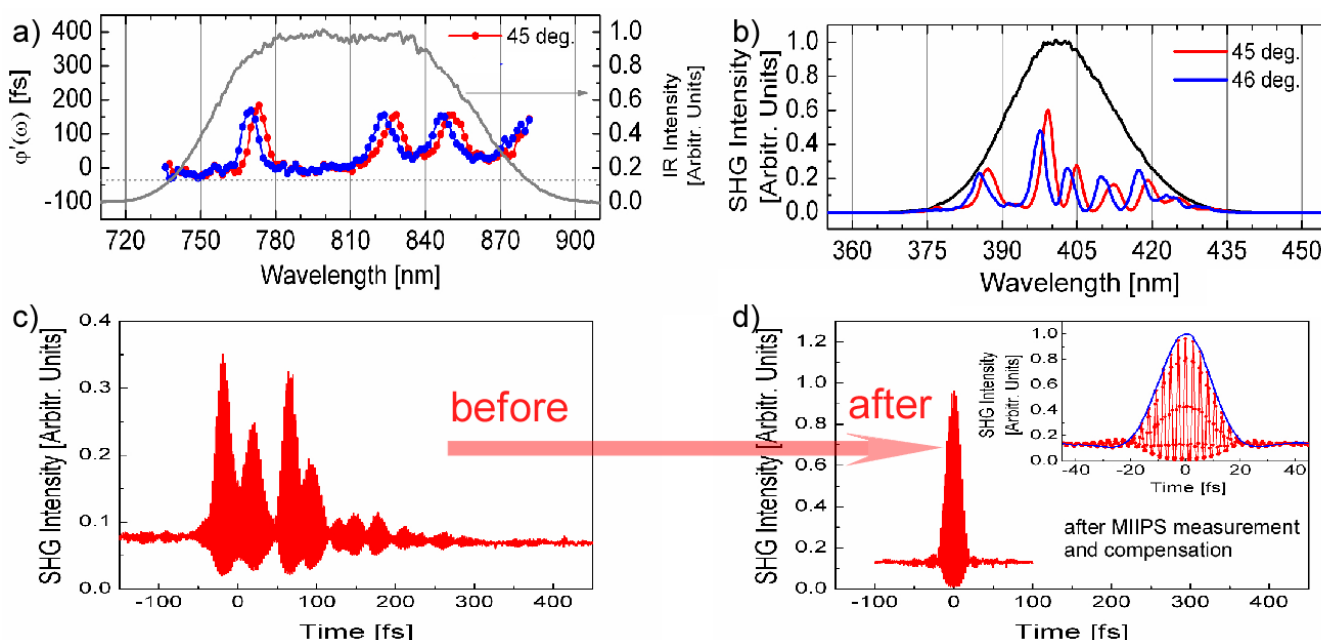


Fig. 1. (a) Dispersion measurements of a same broadband mirror at two different incident angles: 45(red) and 46(blue) degrees. (b) Second harmonic spectra with (red and blue) and without such broadband mirror. (c) Interferometric autocorrelation measurements after the 15-fs pulse hit such broadband mirror at 45 degrees. (d) Interferometric autocorrelation measurements after MIIPS® compensated the dispersion from the broadband mirror. One can clearly see that the pulse went back to 15-fs as it should be.

BioPhotonic Solutions, Inc. offers MIIPS® Certified Ultrafast Optics (MCUO). Each MCUO from this program will be tested individually and shown to be dispersion-free in the specified range of wavelengths. The MCUO service can also be requested for third party optics

Reference:

D. Pestov, V.V. Lozovoy, M. Dantus, "Single-beam shaper based pulse characterization and compression using MIIPS sonogram", Opt. Lett. **35**, 1422 (2010)

