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STUDIES TOWARD IMPROVING THE LASER DAMAGE RESISTANCE OF UV COATING

(Photo Courtesy of LIDARIS.)

The shift in laser wavelength to UV is accompanied by the need to increase the Laser Induced Damage Threshold (LIDT) of the HR (high-reflective) and AR (anti-reflective) coatings on the optics that direct and manipulate the beam. This technical paper will outline, discuss and begin a dialog on a key aspect of optical coating lifetime and LIDT. It will address the roles that different materials and processes play in increasing the durability of coatings in their work environment.

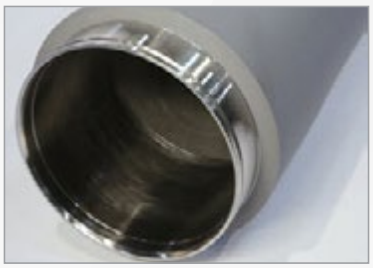
STUDIES TOWARD IMPROVING THE LASER DAMAGE RESISTANCE OF UV COATINGS

Industrial applications of high-power lasers include welding, cutting and marking of various materials ranging from metals to polymers. The kW powers that were available until recently were provided by bulky CO_2 lasers at wavelength 10.6 µm. Since all metals reflect highly at this wavelength, power levels needed to be very high to be efficient. In addition, as lasers became increasingly popular for cutting and welding, stray laser light presented an extreme workplace hazard. These factors posed a strict demand on the coatings that were used to steer the laser beam and anti-reflect the lenses. These problems exist even at 1.06 µm, the wavelength of Nd:YAG lasers. There was a move to shorter wavelengths where material absorption was higher, thus increasing the efficiency of heating needed for welding and cutting. The third harmonic laser wavelength of Nd:YAG at 355 nm, and diode lasers with wavelengths <450 nm, have become the workhorses for the industry. Diode-pumped solid-state lasers are used for micro-machining, micro-lithography, micro-hole drilling, welding in micro-electronics and opto-electronic applications. In many cases, they replace the more expensive and exotic excimer lasers that operate at wavelengths below ~250 nm. High pulse repetition rates near 5 kHz are possible. Some applications require very high peak powers that only pulsed lasers can produce. Pulse widths in the nano-sec range are used.

UV lasers are especially effective for welding copper, aluminum and stainless steel. Copper is widely used to produce commercial electronic devices such as computers and cell phones. The high UV laser powers possible enable faster assembly than previously achievable. One reason for this is that the smaller wavelength permits concentration to a smaller spot-welding size.

Click to access the full "Laser Damage Resistance" technical paper...

A BASIC STUDY ON ZrOx ROTATABLE SPUTTERING



Zirconium oxide is an attractive material for a robust top coating on architectural glass. Metallic Zr shows a very high affinity to oxygen, which leads to some challenges in target manufacturing and sputtering. Therefore, electrically conductive sub-oxide targets are an interesting alternative to the metal. In this technical paper, we investigate the sputtering from ZrOx cylindrical targets, with focus on practical aspects, such as burn-in and arc management requirements to the power supply.

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