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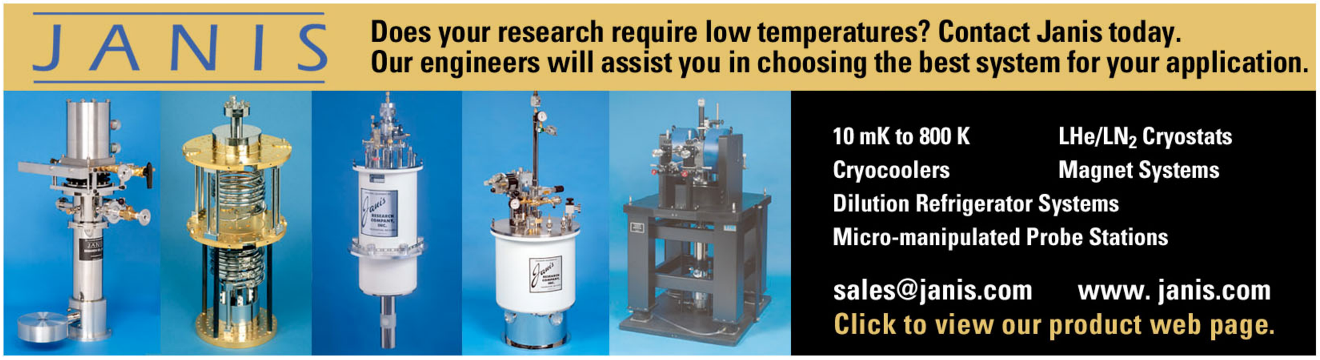

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Erratum: "Plasma formation and structural modification below the visible ablation threshold in fused silica upon femtosecond laser irradiation" [Appl. Phys. Lett. 91, 082902 (2007)]

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We have discovered an error in laser fluence determination in the above-mentioned letter,[1] which is likely to affect also a considerable number of publications in this field. The peak laser fluence is calculated as twice the pulse energy divided by the spot size A (area over which the beam intensity is $\geqslant 1/e^2$ of the peak intensity). While we had used correct values for the pulse energies, the spot size had been determined *erroneously on fused silica*, using a representation of the diameter of an optically induced pattern (in our case the maximum extension of the transient free electron plasma) as a function of the natural logarithm of the pulse energy, as proposed by Liu *et al.*[2] However, beam intensity profiling with this method requires the use of a *low band-gap material*, which shows linear absorption at the laser photon energy used ($h\nu = 1.55$ eV), a condition that is not fulfilled by fused silica ($E_g = 7.2$ eV). While for moderate band gap materials such as borosilicate glass ($E_g = 4$ eV) spot size determination using the method of Liu *et al.* appears to provide correct values,[3,4] we observe a substantial deviation from the linear behavior in the above-mentioned representation for fused silica and significant data scattering.

In order to obtain a correct value of the spot size, we propose chalcogenides for phase change applications as suitable beam profiling materials because of their typically low band gap and the large optical contrast upon phase change. We have used polycrystalline 45 nm thick $Ge_2Sb_2Te_5$ films ($E_g = 0.5$ eV) grown on Si wafers and performed a series of single laser pulse irradiations at increasing pulse energies, causing localized film amorphization.[5] The diameter of the so-produced amorphous spots was chosen as the optically induced pattern for the above explained representation, yielding a linear dependence with very little scatter. The so-obtained experimental elliptical spot size A_{GST} ($75.9\ \mu m \times 50.8\ \mu m$) was by a factor of 16% larger than the one obtained using fused silica as profiling material ($71.4\ \mu m \times 46.4\ \mu m$) under identical focusing conditions. As a consequence, the fluence values reported in Ref. 1 have to be corrected by applying the spatial intensity distribution corresponding to the spot size A_{GST}, which was done for the fluences quoted in Ref 1, and which are listed in Table I.

Another aspect has to be considered when comparing the laser fluence values reported in Ref. 1 (obtained for an angle of incidence $\alpha = 54°$) with literature data (predominantly reported for normal incident radiation). An elevated angle of incidence for an s-polarized beam leads to an increase of the observed threshold values by an angle-dependent factor due to a higher Fresnel reflectivity. This factor can be estimated[6] for fused silica irradiated at 800 nm as $C_{\text{angle}} = [1 - R_s(54°)]/[1 - R_s(0°)] \approx 0.91$. Thus, fluence values taken from Ref. 1 can be compared directly with fluence values reported in literature for normal incident radiation, after correcting them using the true spot size A_{GST} (Table I, column 2) and multiplying them by C_{angle}, yielding the values listed in column 3 of Table I. Figure 1 has been updated using fluence values corrected by C_{spotsize} for $\alpha = 54°$.

This correction has no effect on the conclusions drawn in the above-mentioned letter.

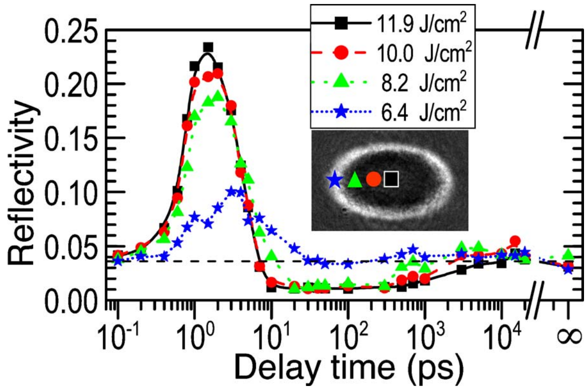

FIG. 1. (Color online) Temporal evolution of the characteristic features of the image sequence shown in Fig. 2 of Ref. 1. Surface reflectivity at different positions (inset) and, thus, different local fluences (labels), corrected according to the method described above and valid for the angle of incidence α used (54°). The inset corresponds to a reflectivity image taken at 7 ps delay

TABLE I. Relation of original fluence values published (left column) in Ref. 1 to corrected fluence values at angles of incidence $\alpha = 54°$ (middle column) and $\alpha = 0°$ (right column). For details, see text.

Fluence values (J/cm²) reported in Ref. 1 $\alpha = 54°$	Fluence values (J/cm²) corrected by spot size A_{GST} $\alpha = 54°$	Fluence values (J/cm²) corrected by A_{GST} and constant factor C_{angle} $\alpha = 0°$
12.8	11.9	10.8
10.5	10.0	9.1
8.5	8.2	7.5
6.4	6.4	5.9
4.7	4.9	4.4

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