ICPEPA-10

10th International Conference on Photoexcited Processes and Applications

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Book of Abstracts

1. A. L. Walter, H. S., J. K., K.-J. Jeon, A. Bostwick, S. Horzum, L. Moreschini, Y. J. Chang, F. M. Peeters, K. Horn, and E. Rotenberg, New family of graphene-based organic semiconductors: An investigation of photon-induced electronic structure manipulation in halffluorinated graphene, Phys. Rev. B, **93**, 075439 (2016);
2. A. Datcu, L. Duta, A. Pérez del Pino, C. Logofatu, C. Luculescu, A. Duta, D. Perniu and E. György, One-step preparation of nitrogen doped titanium oxide/Au/reduced graphene oxide composite thin films for photocatalytic applications, RSC Adv., **5**, 49771–49779 (2015);
3. Y. Liang, Y. Li, H. Wang, J. Zhou, J. Wang, T. Regier and H. Dai, Co_3O_4 nanocrystals on graphene as a synergistic catalyst for oxygen reduction reaction, Nat. Mater., **10**, 780-786 (2011);
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Plasma generated during underwater laser shock processing

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Knowledge of the behaviour of materials and their properties under conditions of dynamic deformation is essential for proper designing of machines and equipment and for predicting their behaviour in manufacturing and operating processes. Ultra-high speed deformations occur in the processes of friction and machining of materials, as well as, operation of components used in many fields of technology. Properties of materials under conditions of dynamic deformation significantly differ from those in static conditions.They depend on the speed of deformation, microstructure of the material and temperature. Laser shock processing is regarded as a very promising tool for studying dynamic deformation of materials[1,2]. Pulse laser ablation in water supplies suitable conditions for such studies at relatively low laser fluences. The investigated metallic samples are usually coated with a thin layer of graphite in order to provide full absorption of the laser radiation. Additionally, such a layer isolates the investigated metal from thermal effects connected with interaction of the laser beam. In this paper the ablation of graphite layer is studied to get better insight into underwater laser shock processing. An 10 ns laser pulse of 1064 nm Nd:YAG laser with intensity of 1.5 $GW\cdot cm^{-2}$ was used to produce a shock wave. The induced plasma pressure was about 2 GPa as infered from measurements with the use of piezoelectric pressure transducers located at the bottom surface of the sample.

The emission spectra of ablated plume consist mainly of continuous radiation. After 50 ns from the laser pulse the absorption spectra of OH ($A^2\Sigma^+ - X^2\Pi_i$) system appears. This absorption band results from the absorption of plasma radiation in water and its temperature of about 5000 K reveals the temperature of dissociated water layer, which surrounds the plume. After 100 ns strongly broadened molecular spectra of C_2 Swan system appear, which become better resolved with longer delay time as the plasma pressure and electron density decrease. Very weak carbon atomic lines are observed after 500 ns from the laser pulse.

Fig. 1a shows the calibrated continuum radiation as a function of wavelength measured 20 ns after the laser pulse. At this moment the experimental intensity fits well to that of blackbody with a temperature of 17000 K. At longer delay times the intensity of plasma radiation deviates significantly from that of blackbody. The temperature can be then obtained from Swan spectra (Fig. 1b).

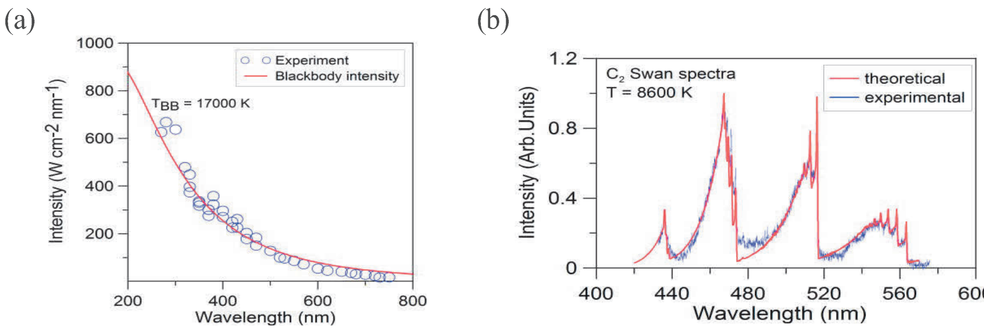

Figure 1: (a) Plasma intensity 20 ns after the laser pulse and blackbody fit.
(b) Experimental Swan spectra 500 ns after the laser pulse together with theoretical fit.

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