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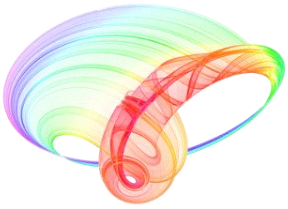

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Inducing periodic structures on multilayers of Ti and Ta by femtosecond laser beam

Aleksander G. Kovačević[1], Suzana M. Petrović[2], Davor Peruško[2], Vladimir Lazović[1], Iva Bogdanović-Radović[3], Vladimir Pavlović[4], Dejan Pantelić[1], Branislav M. Jelenković[1]
[1]*Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Belgrade, Serbia*
[2]*Institute of Nuclear Sciences „Vinča", University of Belgrade, Po Box 522, 1000 Belgrade, Serbia*
[3]*Institute "Ruđer Bošković", Bijenička cesta 54, 10000 Zagreb, Croatia*
[3]*Faculty of Agriculture, University of Belgrade, Nemanjina 6, 11080 Belgrade, Serbia*
e-mail: Aleksander.Kovacevic@ipb.ac..rs

Nanostructuring of surfaces by femtosecond (fs) laser beam interaction is the topic of research for some time [1]. The emergence of the laser-induced periodic surface structures (LIPSS) on metal-dielectric surfaces is of interest from fundamental and application points of view. The interaction of fs beam with thin films can also generate LIPSS, with the arrangement of thin films in multi-layer structure being important for the quality of the LIPSS [2]. Excellent properties of titanium (Ti) and tantalum (Ta), like corrosion resistance, heat transfer properties and workability, recommend them as useful materials for a wide range of applications - heat exchangers, reactors, and others exposed to extremely corrosive fluids. Combining Ti and Ta could be attractive for applications, but challenging, as they have great difference in melting point and density, therefore, TiTa alloys are still not widely adopted in applications [3].

We have performed the interaction of fs laser beam with multilayer Ti/Ta samples in order to investigate the effects of interaction with ultra-short pulses to surface morphology and to both surface and bulk chemistry of newly generated compounds. Each layer of the sample was 17 nm thick. The interactions were in two regimes: dynamic and static, depending whether the beam scanned over the sample surface or not. SEM and PIXE RBS analyses have shown the LIPSS formed with or without ablation depending on the beam fluence. The LIPSS orientation is dependent on the input beam polarization. Both types of LIPSS were formed, low- and high-spatial frequency LIPSS, with periods being as low as 120 nm.

REFERENCES

[1] A. Y. Vorobyev, C. Guo, Laser Photon. Rev. 7, 385-407 (2013), and the references within.
[2] A. G. Kovačević, S. Petrović, B. Bokić, B. Gaković, M. T. Bokorov, B. Vasić, et al., Appl. Surf. Sci. 326, 91-98 (2015).
[3] S. L. Sing, W. Y. Yeong, F. E. Wiria, J. Alloy. Compd. 660, 461–470 (2016).