Nanostructured surfaces

Ring structures on the Mo, W and Si surfaces during the irradiation with femtosecond laser pulses

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In this paper structures on the surfaces of Mo, W and Si after femtosecond laser irradiation with the help of the focusing lens F=200 mm were investigated. Samples were irradiated with the Ti:Sa laser with the wavelength λ=820 nm, the pulse duration τ_i140 fs and the pulse repetition rate 1 kHz, W10^{10}÷10^{12} W/cm^2.

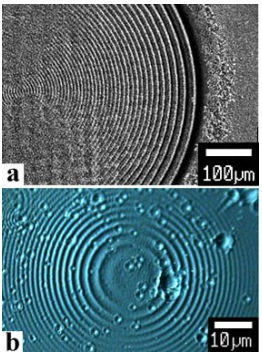

Fig. 1. Mo (a), Si (b).

Apart from the quasiperiodical structures with the period λ on the Mo (fig. 1, a) and W surfaces, other structures were discovered, namely like those observed in [1], in the form of concentric rings, the distance between which increases with increasing of the ring number Analyzing the field distribution in the prefocal plane of the lens with spherical aberration [2] a conclusion can be made that the structures on the surface represent this field.

In case of the structure on the Si surface (fig. 1, b), distance between adjacent rings decreases with the increase of the ring number. Similar structures were observed in [3]; they have size similar to the laser spot d_L order and are bound with the creation of Newton rings. Physical mechanisms providing formation of such structures are being discussed. In our case, the concentric structures of different sizes and with an order of magnitude smaller than d_L are strewed over the irradiated surface. Moreover, the irradiated area is covered with “craters” with the diameter 1÷5 μm. In order to clarify the mechanism of the structure creation on the Si surface, additional investigations are required.

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3. *Von der Linde D., Sokolowski-Tinten K.* The physical mechanisms of short-pulse laser ablation // Appl. Surf. Sci. -2000. -**154-155.** –P. 1–10.