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Damage of gallium arsenide created after irradiation by ultra-short VUV laser pulse

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Various aspects of the ablation mechanism by laser pulse with different duration times have been discussed in several review papers. Shortening the pulse duration time to femtoseconds causes obtaining the phenomena occurring in the material in ultra-short time Chemical reactions, phase transitions and surface processes occur in a very rapid timescale comparable to the natural oscillation periods of atoms [1,2].

Ultra-short pulse ablation was studied for a wide variety of materials, including semiconductors i.e. GaAs. Up to now mainly femtosecond optical lasers generating radiation from near IR range have been used for material stimulation [3-5].

Recently the VUV and XUV laser beam generated by the new type of source are becoming interesting for materials modifications. Preliminary experimental results confirmed the assumption that the absorption depth for most materials can be much bigger, than when using femtosecond optical pulses [6-8]. Damage processes induced by laser pulses lead to the formation of specific morphological structures of sizes in micrometer and nanometer scales [9,10].

There is still lack of knowledge about the basic physical mechanisms of nano- and microstructures formation, including the impact of the wavelength of generated radiation and of laser fluence. Detailed studies of surface structures morphology and structural changes would provide a clear physical picture of the ablation processes in materials irradiated by femtosecond pulses from VUV range.

In the current work we present the laser ablation investigations of GaAs. The experiments were conducted with the laser femtosecond pulse at the wavelength 32 nm. Effects of the ablation process on the structure and the composition of the samples in the micron scale is studied using a number of analytical techniques.

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