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# Selective ablation of nanolayer Ti based thin films by single pulse femtosecond laser

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**Laser processing of materials is unique method which allows their morphological as well as composition modifications. In case of usage of ultra-short laser pulses (pulse duration less than picosecond) the laser processing is extremely precise. Irradiation of materials by femtosecond laser enables removal or alteration of their surface at nano/micro level without change of non-irradiated area. Nano scale multilayer thin films are attractive composite materials due to their properties that cannot be obtained in the case of materials of the same bulk constituents. Selective ablation of the upper layer of the nanolayer thin film with little or without damage of the layer or the substrate beneath is significant for applications. The effects of ultra-short laser pulses on reactive titanium-aluminium (Ti/Al) and nickel-titanium (Ni/Ti) nano-layer thin films (NLTF) were investigated. The samples composed of five bilayers (Ti/Al and Ni/Ti respectively) were prepared by ion sputtering on a Si substrate. Single pulse irradiations were done in air by focusing and with linearly polarized gaussian laser beam of 515 nm wavelength, 200 fs pulse duration and variable pulse energy. One step selective ablation of upper layer from NLTFs at low laser pulse energies (Figure 1 and 2) and complete ablation of the thin films from the Si substrate at higher pulse energies were registered. Effects of laser induced morphological and composition changes were monitored by scanning electron microscopy/energy dispersive x-ray spectroscopy (SEM & EDS) and profilometry. Spalative ablation could be the main mechanism that caused ablation of the upper layers from the nanolayer thin films.**

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