Faculty of Electrical Engineering & Computer Science
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The enhancement of an incubation model for the description of thin film laser ablation.

ABSTRACT - Masterthesis

Laser material processing as a promising technology is attractive for scientists, engineers and industry. Laser enables the machining of surfaces with micron features. Today, this technology innovate new possibilities of highly precise and fast patterning process which was not possible with the old methods.

Patterning of strain gauges under ultrashort pulse laser is a new technology which is investigated and executed in Laser Zentrum Hannover. In order to achieve the appropriate result, it is required to characterize the ablation process of thin strain sensitive NiCr films specifically. For this purpose the actual relation between the crater squared diameter and applied number of pulses is needed that is not defined realistically by the already introduced famous incubation model by Jee. The aim of this thesis is to introduce two new models to enhance the incubation model by Jee. These models improve the validity limitation of the model by Jee and also enable the determination of number of pulses affecting the surface in line ablation by defining the incubation threshold.

In order to examine the models and compare them, spot ablation experiments with different laser beam peak fluences and a varying number of applied laser pulses are carried out on NiCr film under picosecond laser. Each model is fitted by curve fitting to the results to check the exactness and validity of that model. The effect of laser pulse repetition rate an incubation behavior is also studied as the next step by keeping all the parameters the same and changing the repetition rate in ablation experiment.