Laser processing - Powder consolidation - CVD of optical materials

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Abstract :

Understanding the dynamics of complex processes is key for developing novel processes and also for efficient improvement and optimization of processes. Three different complex and only barely understood processes are chosen and some influencing parameters are discussed.
At Empa in Thun a very large scale Excimer laser processing system is installed. The specifications and limitations of this tool will be presented. Some products such as microlens arrays will be shown. For ablation of materials the plasma absorption, might shorten the real exposure time of the substrate debris deposition and therefore improve the quality of ablation. Another interaction of materials with electromagnetic waves is the heating of bulk materials by micro-waves. In micro-wave heating, the materials are heated homogenously as opposed to furnace heating in which strong thermal gradients cannot be avoided. On the other hand, the complexity of microwave heating processes will be discussed. Some impressive results of very fast controlled crystallization of materials will be presented. Finally in High Vacuum Chemical Vapor Deposition (HV-CVD) systems a very interesting phenomenon appears, the decrease of deposition rate with increasing precursor flow at constant temperature. This observation and impressive results of growth of highly oriented $LiNbO_3$ films on sapphire will be presented.