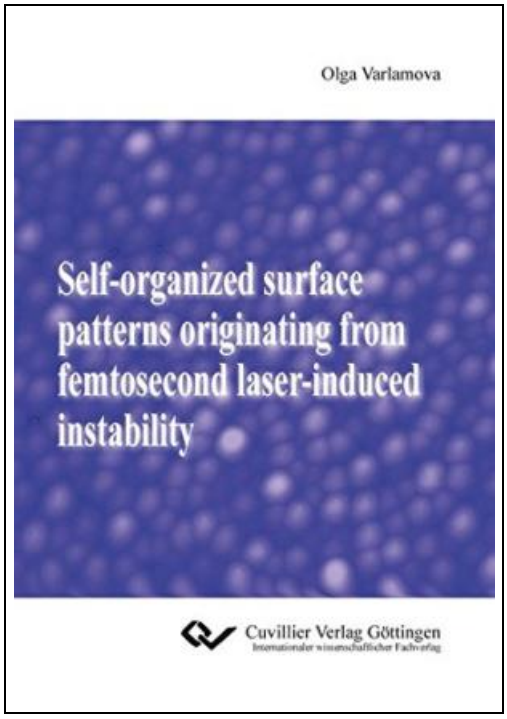
Self-organized surface patterns originating from femtosecond laser-induced instability



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Cuvillier Verlag Jan 2014, 2014. Taschenbuch. Condition: Neu. Neuware - Zusammenfassung/English The phenomenon of laser-induced periodic surface structures (LIPSS), or ripples, generated by femtosecond laser pulses on various solid targets is considered in this dissertation. The experimental observations and an astounding similarity of the structures to other patterns originating from instabilities led to the idea to attribute the femtosecond laser nanostructuring to a self-organized pattern formation from laser-induced surface instability. The main aim of the work is a better understanding of the fundamental processes of laser-matter interaction resulting in pattern formation by femtosecond laser ablation. The problem is of great interest both in fundamental and applied science. The knowledge of the underlying physical mechanisms will provide the opportunity to control surface nanostructuring, which has a big application potential in many modern technologies. Zusammenfassung/Deutsch Diese Dissertation beschäftigt sich mit dem Phänomen der Laser-Induzierten Periodischen Oberflächenstrukturen (LIPSS, Ripples), erzeugt bei der Ablation durch ultrakurze Lichtimpulsen an unterschiedlichen Targetmaterialien. Die experimentelle Beobachtungen und eine erstaunliche Ähnlichkeit der Strukturen zu anderen Mustern, die aus Instabilitäten entstehen, haben zur Idee geführt, die Entwicklung der Nanostrukturen im Rahmen einer Oberflächenselbstorganisation aus einer laserinduzierten Instabilität zu erklären. Das wesentliche Ziel der Arbeit bestand darin, die fundamentale Physik der Oberflächenstrukturierung bei der Femtosekundenlaserablation besser zu verstehen. Die Kenntnis der physikalischen Mechanismen hilft, die Nanostrukturierung von Oberflächen zu kontrollieren, die ein großes Anwendungspotenzial in vielen modernen Technologien bietet. 140 pp. Deutsch.

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