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Effects of microstructure modification induced by laser interference patterning of thin films

By Rodolphe Catrin

Shaker Verlag Jul 2012, 2012. Taschenbuch. Book Condition: Neu. 208x149x15 mm. Neuware - Manipulating a material's microstructure to obtain the desired property at the desired place is one of the most important challenges in Materials Science. Since physical and chemical properties of metals are strongly correlated to their microstructure, its precise tailoring is of the highest interest. Laser Interference Patterning has been developed to locally modify the microstructure as well as the mechanical, electrical, optical and tribological properties of materials with a periodic distribution. This technique is exploited here in order to study: i) the design of advanced architectures via local melting and resolidification processes, ii) the morphological, microstructural and thermal evolution of the obtained long-range ordered architectures, iii) the enhancement of the film conductivity and the friction coefficient for technical applications. The investigations were carried out on two relevant thin film systems: pure metallic films and thin films of nitride and oxide matrices with embedded metallic particles. Microstructural influences of the irradiation method within the fabricated periodic arrays were systematically investigated. Focus was kept on localized microstructure relocation, chemical decomposition or segregation of nanoparticles. Additionally, the physical (hardness, electrical resistivity, friction coefficient) and chemical (etching capacity) properties of the...

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