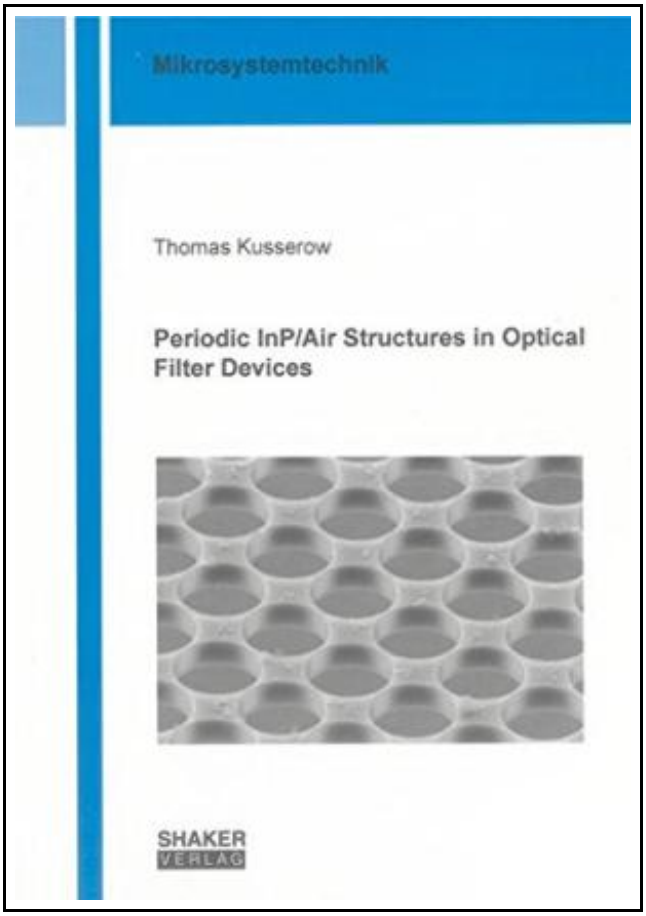
Periodic InP/Air Structures in Optical Filter Devices



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PERIODIC INP/AIR STRUCTURES IN OPTICAL FILTER DEVICES

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Shaker Verlag Mrz 2011, 2011. Taschenbuch. Book Condition: Neu. Neuware - Filter devices are a crucial element of analytic information systems which provide selective and evaluated signals when combined with detectors and processing units. Optical signals are advantageous due to their low susceptibility to perturbations, high potential bandwidth and fast propagation speed. Applications in the fields of data transmission or spectroscopic sensors are mainly located in the near infrared spectral range. In this thesis optical filter devices are investigated which are optimised for this spectral range and take further advantage of the properties of miniaturised structures (MEMS technology). As material system Indium Phsophide (InP) has been chosen which gives the best opportunity for integration of passive as well as active optoelectronic devices in the spectral range between 900 nm and 2400 nm. Periodic structures are implemented as base design element since these show a strong impact on the propagation properties which cannot be achieved by absorptive or dispersive elements and are due to interference effects of the also periodic light waves. An Introduction to elements like Bragg reflectors, Fabry-Pérot filters and Photonic Crystals is given. High contrast of refractive indices in the periodic structures is desired and hence air is introduced as second material to Indium Phosphide. A process for fabrication of such air-gap Fabry-Pérot filters based on semiconductor processing technology and especially on a sacrificial layer etch process is discussed. A scientific investigation on the residual stress in Indium Phosphide layers, caused by an arsenic carry-over effect, is presented and different methods to compensate this undesired effect are given. Studying the influence of nanooptical structures implemented in the released thin-films is part of the investigation as well. Sacrificial layer etching is one of the crucial process steps during fabrication of the filter devices and defines the quality of the...

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