

PERIODIC INP/AIR STRUCTURES IN OPTICAL FILTER DEVICES

von

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Abstract: In this thesis periodic structures consisting of InP and air features are investigated concerning their application in optical filter elements. Fabry-Pérot filters with DBR mirrors are discussed as well as guided-mode resonance structures based on InP membranes with photonic crystals. The aim of this work is the enhancement of these filter devices regarding their optical properties as well as processing quality. Therefore research on tailored stress and sacrificial layer wet etching, monolithic integration of a photodetector and related processes and also anti-reflective coatings on filter elements was conducted and results are given here. Finally, the investigation and results of a new polarising element with photonic crystals are presented.

Key Words: Periodic Structures, Optics, InP, MEMS, PhC

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Titel: Periodische InP/Luft Strukturen in optischen Filterbauelementen

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Zusammenfassung: In dieser Arbeit werden periodische Strukturen, bestehend aus InP- und Luftelementen, hinsichtlich ihrer Verwendung in optischen Filterbauelementen untersucht. Sowohl Fabry-Pérot Filter mit DBR Spiegeln als auch Strukturen, die geführte Resonanzen besitzen und auf InP-Membranen mit Photonischen Kristallen basieren, werden vorgestellt. Das Ziel dieser Arbeit ist die Verbesserung und Erweiterung von bestehenden Filtern bezüglich ihrer optischen Eigenschaften und Qualität des Herstellungsprozesses. Hierfür wurden Untersuchungen zur Kontrolle von Schichtverspannung und Opferschichtätzen, zur monolithischen Integration eines Photodetektors und damit verbundener Arbeitsschritte sowie zu reflexmindernden Schichten auf Filtern durchgeführt, deren Ergebnisse hier gezeigt werden. Zuletzt werden die Entwicklung eines neuartigen, polarisationselektiven Bauteils mit Photonischen Kristallen und die zugehörigen Ergebnisse präsentiert.

Stichwörter: Periodische Strukturen, Optik, InP, MEMS, PhC

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