

2004年微电子学研究所发表的学术论文

一、 微纳器件与系统研究室

多晶锗硅室温微测辐射热计线性阵列的研制

董良, 岳瑞峰, 刘理天

固体电子学研究与进展, 2004, 24(2)

采用超高真空气相淀积系统(UHVCVD)制备了多晶锗硅薄膜(Poly-Si_{0.7}Ge_{0.3}), 研究了它的退火特性和电阻温度特性。将多晶锗硅薄膜电阻作为微测辐射热计的敏感元件, 采用体硅微机械加工技术制作了8×1桥式微测辐射热计线性阵列, 优化设计的微桥由两臂支撑, 支撑臂的长和宽分别为220μm和8μm, 桥面面积为80μm×80μm。测试结果表明, 在773K黑体源8~14μm红外辐射下, 调制频率为30Hz时, 阵列中各单元的电压响应率为6.23kV/W~6.40kV/W, 探测率为2.24×10⁸cmHz^{1/2}W⁻¹~2.33×10⁸cmHz^{1/2}W⁻¹, 热响应时间为21.2ms~22.1ms, 表明了器件具有较高的性能及较好的一致性。

Development of linear uncooled microbolometer array made of poly-SiGe film

DONG Liang, YUE Ruifeng, LIU Litian

Research and Progress of Solid-State Electronics, vol24, no.2, 2004

Poly-Si_{0.7}Ge_{0.3} film is prepared by ultra high vacuum chemical vapor deposition (UHVCVD) system. The dependences of the poly-Si_{0.7}Ge_{0.3} resistance on operation temperature and on annealing temperature are investigated. Optimized structure of two-leg supported microbridge for microbolometer is designed, with a surface area of 80μm×80μm, a leg length of 220μm and a leg width of 8μm. With bulk silicon micromachining technique, a 8×1 linear microbolometer array based on poly-Si_{0.7}Ge_{0.3} resistor as thermosensitive element is fabricated. The characteristics of the linear array are investigated to infrared radiation in the spectral region of 8~14μm, with a black body temperature of 773K. Measurements show that for pixels of the linear array, a responsivity of 6.23kV/W~6.40kV/W, a detectivity of 2.24×10⁸cmHz^{1/2}W⁻¹~2.33×10⁸cmHz^{1/2}W⁻¹ and a thermal response time of 21.2ms~22.2ms are achieved at a chopper frequency of 30Hz.

UHV/CVD 自对准生长Ge量子点

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微纳电子技术, 41(2), p17-22(2004)

在超高真空化学气相外延设备(UHV/CVD)上生长了小尺寸、大密度、垂直自对准的Ge量子点。采用原子力显微镜分析量子点的尺寸, 从而优化其生长温度和时间。在550 °C、15 sec的条件下生长出尺寸最小的量子点, 直径30nm, 高约2nm。最上层多层结构Ge量子点中岛状量子点的比例为75%, 其直径66nm, 高11nm, 密度4.5×10⁹cm⁻³。利用透射电子显微镜分析了垂直自对准的Ge量子点的截面形貌, 结果表明多层结构Ge量子点是垂直自对准的。Ge量子点及其浸润层的喇曼谱峰位分别为299 cm⁻¹和417 cm⁻¹, 说明Ge量子点是应变的并且界面存在互混现象。采用光荧光谱分析了Ge量子点的光学特性。初步讨论了硼原子对Ge量子点自组织生长均匀性的影响。

Self-Organized Growth of Ge Quantum Dots by UHV/CVD

HUANG Wen-tao, DENG Ning, CHEN Pei-yi, LUO Guang-li, QIAN Pei-xin

Micronanoelectronic Technology, 41(2), p17-22(2004).

Small size, large density and vertical ordering Ge quantum dots (QDs) were grown by ultra-high vacuum chemical vapor deposition system. Atomic force microscopy study was carried out to optimize growth temperature and time. The vertical ordering of the Ge QDs was investigated by transmission electron microscopy as well. The smallest Ge QDs were obtained under the growth temperature of 550 °C and growth time of 15 seconds in our system, with lateral size ~30 nm and height ~2 nm. The stack Ge QDs were vertically aligned. About 75% of the uppermost Ge QDs are larger dome QDs, which is 66 nm wide and 11nm high, with a density of 4.5×10⁹cm⁻². The Raman peaks are located at 299 cm⁻¹ for Ge QDs and 417 cm⁻¹ for wetting layer, which indicate the stacked Ge QDs are strained and wetting layers are intermixed. The optical characteristics of Ge QDs were studied by photoluminescence. Uniform dome-shaped Ge QDs were obtained after boron pre-deposition with narrow size distribution less than 3%.

介质上电润湿现象的研究*

曾雪峰, 董良, 吴建刚, 岳瑞峰, 刘理天

仪器仪表学报, 2004, 25(4): 263-264.

本文介绍了介质上电润湿的基本原理, 分析了介质层材料的介电常数对接触角变化的影响, 并提出了优化介质薄膜厚度的方法, 为介质上电润湿的进一步应用提供了理论基础。

Study of the Electrowetting-On-Dielectric (EWOD)

Zeng Xuefeng, Dong Liang, Wu Jiangan, Yue Ruifeng, Liu Litian

Chinese Journal of Scientific Instrument, Vol. 25, 2004

The paper introduces the principle of electrowetting-on-dielectric (EWOD), analyzes the effect of the dielectric constant of materials of the dielectric layer on the change of the contact angle, and puts forward a way to optimize the thickness of thin films of EWOD, which

provide further theory support for the application of EWOD.

一种新型厌水性碳氟聚合物薄膜的制备*

曾雪锋, 岳瑞峰, 吴建刚, 胡欢, 董良, 刘理天

仪器仪表学报, 2004, 25 (4) : 271-272.

■利用ICP-CVD工艺制备出一种新型厌水性碳氟聚合物薄膜, 并给出了制备薄膜的工艺参数。通过观测该薄膜的表面形貌和它与去离子水之间的接触角, 结果表明, 该薄膜均匀致密, 与去离子水之间的接触角高达110°。

Deposition of a New Hydrophobic Films of Fluorocarbon Polymer

Zeng Xuefeng, Yue Ruifeng, Wu Jiangang, Hu Huan, Dong Liang, Liu Litian

Chinese Journal of Scientific Instrument, Vol. 25, 2004

■This paper puts forward the techniques of depositing hydrophobic thin films of the fluorocarbon polymer by ICP-CVD and the process factors of ICP-CVD. The results of measuring surface characters of films and the contact angle between films and the deionized water show that the thin films of fluorocarbon polymer are uniform and compact, and the contact angle reaches 110°.

Si组分对SiGe量子点形状演化的影响

邓宁, 陈培毅, 李志坚

物理学报, 53(9), p3136-40, 2004

■研究了自组装生长SiGe岛(量子点)中Si组分对形状演化的影响, 采用UHV/CVD方法生长了不同Si组分的SiGe岛, 用AFM对其形状和尺寸分布进行了分析, 实验结果表明SiGe岛从金字塔形向圆顶形转变的临界体积随Si组分的增大而增大。通过对量子点能量的应变能项进行修正, 解释了量子点中Si组分对形状的影响, 在特定的工艺条件下得到了单模尺寸分布的金字塔和圆顶形量子点, 结果表明, 通过调节SiGe岛中的Si组分, 可以实现对SiGe岛形状和尺寸的控制。

Influence of Si concentration on the evolution of shape and size of self-assembled Ge islands

Deng N, Chen PY, Li ZhJ

ACTA PHYSICA SINICA 53 (9), p3136-3140 SEP 2004

■The influence of Si concentration on the shape transition of self-assembled SiGe islands was investigated. SiGe islands with different Si concentrations were grown by UHV/CVD. The topography and size distribution of islands were characterized by atomic force microscopy. The results show that the critical volume increases with Si concentration, at which the islands change from pyramids to domes. A modified model was established and used to explain the influence of Si concentration on the shape transition by introducing the revised strain energy term depending on Si concentration. Dome-shaped as well as pyramid-shaped uni-modal SiGe islands were grown under suitable conditions. This research indicates that the shape and size of the self-assembled islands can be controlled more accurately by adjusting Si concentration.

超高真空化学气相淀积自组织生长锗量子点

邓宁, 张磊, 黄文韬, 陈培毅

纳米技术与精密工程, 2(3), 171-74(2004)

■采用超高真空化学气相淀积系统制备了小尺寸、高密度、纵向自对准的Ge量子点。通过TEM和AFM对埋层和上层量子点的形貌和尺寸分布进行了研究, 对生长的阿温度和进行了优化。采用硼予淀积的方法得到了尺寸分布小于3%的均匀的圆顶型Ge量子点。采用低温光荧光测量了多层量子点的光学特性。在10K的PL谱可以观察到明显的蓝移现象, 表明量子点中较强的量子限制效应。量子点非声子峰的半高宽约为46 meV, 表明采用UHV/CVD工艺生长的多层量子点具有较窄的尺寸分布。

Self-Organized Growth of Ge Quantum Dots by UHV/CVD

Deng Ning, Zhang Lei, Huang wentao, Chen Peiyi

Nanotechnology and Precision Engineering, 2(3), p171-74(2004)

■ Small size, large density and vertical ordering Ge quantum dots (QDs) were grown by ultra-high vacuum chemical vapor deposition (UHV/CVD) system. The morphology and size distribution of embedded and upper Ge dots were studied by TEM and AFM to optimize growth temperature and duration. Uniform dome-shaped Ge QDs were obtained after boron pre-deposition with narrow size distribution less than 3%. The optical characteristics of stacked Ge QDs were studied by low temperature photoluminescence (PL). From PL Spectrum under 10K obvious blue shift was observed induced by stacked Ge dots grown by UHV/CVD.

磁控溅射法制备IrMn底钉扎自旋阀研究

欧阳可青, 任天令, 刘华瑞, 曲炳郡, 刘理天, 李伟

功能材料与器件学报

■采用高真空直流磁控溅射的方法, 在玻璃衬底上制备了结构为Ta/ buffer layer/ IrMn/ CoFe/ Cu/ CoFe/ NiFe/ Ta的IrMn底钉扎

自旋阀。研究了NiFe和Cu作为缓冲层对自旋阀磁性能的影响,并对缓冲层厚度进行了参数优化,当缓冲层厚度为20Å时自旋阀各项性能达到最佳。研究了退火制度对底钉扎自旋阀性能的影响,得到了3000Oe强磁场下200℃保温1小时为最佳处理条件。通过结构的改善和工艺的优化,得到的底钉扎自旋阀的磁电阻率8.51%,矫顽场为0.5Oe,交换偏置场超过800Oe。最后对自旋阀的底钉扎和顶钉扎结构进行了比较。

Investigation on High Vacuum Magnetron Sputtering IrMn Bottom Spin Valves

OUYANG Ke-Qing, REN Tian-Ling, LIU Hua-Rui, QU Bing-Jun, LIU Li-Tian, LI Wei

Journal of Functional Materials and Devices

■ The IrMn bottom spin valves, with the structure of Ta/ buffer layer/ IrMn/ CoFe/ Cu/ CoFe/ NiFe/ Ta, were deposited on glass substrate by high vacuum DC magnetron sputtering method. The effect of NiFe and Cu buffer layer was investigated, and an optimized thickness (20Å) of buffer layer was proposed for the bottom pinned structure. The thermal annealing effect on the GMR properties in bottom pinned structure was discussed. The spin valves have a high MR ratio (>8.5%), a low coercivity (<0.8Oe), and a high exchange bias field (>800Oe) after the optimizing the structure parameters and annealing conditions. A further discussion about top structure and bottom structure was given.

一种用于RF技术的厚绝缘层上的铜电感

陈忠民, 刘泽文, 刘理天

仪器仪表学报增刊

■ 本文提出了一种基于氧化多孔硅厚膜隔离技术的Cu电感。厚膜隔离层降低了电感的衬底损耗,提高了电感的Q值。实验中通过多孔硅氧化和电镀Cu制备了电感样品。微波测试显示,电感在2.8GHz的频率下Q值达到了4.5,电感值约为5nH,电感的自谐振频率为9GHz。

Copper Inductor on Thick Insulating Layer for RF Techniques

Chen Zhongmin, Liu Zewen, Liu Litian

Chinese Journal of Scientific Instrument,

■ A copper inductor based on Oxidized Porous Silicon (OPS) insulating technology is presented in this paper. With thick insulating layer the silicon substrate loss has been greatly reduced. Inductors are fabricated by the oxidation of porous silicon and the electroplating of copper. Microwave measurement shows that the Q factor of the inductor reaches 4.5 at 2.8 GHz and the inductance is about 5 nH and the resonate frequency is 9GHz.

基于PECVD工艺的a-SiC_x:H发光微腔的研究.

但亚平, 姚永昭, 王燕, 岳瑞峰, 刘理天.

固体电子学研究与进展, 24(3):281-285, 2004.

■ 以PECVD为制备工艺,a-SiO₂:H/a-Si:H为布拉格反射镜多层膜,a-SiC_x:H为中间腔体发光材料,制备垂直腔面的发光微腔.文章通过模拟确定了微腔的多层膜层数和排列顺序,并对微腔的发光特性进行了反射谱和荧光谱研究.结果表明,该微腔性能良好,能激励出半高宽为9 nm、波长为743 nm的荧光峰,与设计值700 nm基本吻合。

Study on a-SiC_x:H microcavity prepared by PECVD

Dan Yaping, Yao Yongzhao, Wang Yan, Yue Ruifeng, Liu Litian

Research and Progress of Solid State Electronics, v 24, n 3, August, 2004, p 281-285

■ A microcavity prepared by PECVD is proposed. Its distributed Bragg reflectors are composed of periodically stacked a-SiO₂:H/a-Si:H layers and the active layer is filled with a a-SiC_x:H. The number and order of periodically stacked multilayers are determined through simulating. Reflectance and PL spectra are recorded on the sample prepared in the experiment. It is indicated the microcavity can emit a light with FWHM of 9 nm at 743 nm which is proximately consistent with the design wavelength of 700 nm.

基于介质上电润湿的反射式显示单元的研究

吴建刚, 岳瑞峰, 曾雪锋, 董良, 刘理天

仪器仪表学报, Vol. 25 (4), 2004

■ 介质上电润湿能够在微米尺度上实现对液滴的快速驱动,利用这个特点,本文设计了一种新型反射式显示单元,并进行了初步的实验验证.结果表明,与传统反射式显示单元相比,此结构具有高反射率、高对比度和低驱动电压等特性。

Investigation of reflective display cell based on electrowetting-on-dielectric

Wu Jiangang, Yue Ruifeng, Zeng Xuefeng, Dong Liang, Liu Litian

Chinese Journal of Scientific Instrument, Vol. 25 (4), 2004

■ This paper introduces a new reflective display technology based on electrowetting-on-dielectric (EWOD). EWOD is a new technology for the rapid control of liquids on a micrometer scale. Owing to the capability of manipulating the liquids, EWOD can be used to the reflective display. Compared with the conventional technology of reflective display, it shows high reflectivity, high contrast and low drive voltage.

实现定量混合的PDMS微流体器件的研究

付世, 董良, 岳瑞峰, 刘理天. 25(4s):304-305, 2004.

仪器仪表学报,

介绍了实现微流体的精确定量和快速混合的基本方法, 设计并制作了采用基于PDMS通道的微流体器件。

PDMS-based Microfluidics Devices with Capability of Metering and Mixing

Fu Shi, Dong Liang, Yue Ruifeng, Liu Litian

Chinese Journal of Scientific Instrument, Vol. 25, 2004

It presents a new approach to realize the exact metering and quick mixing. The microfluidic device based on PDMS channels is designed and fabricated.

硅基垂直腔面光发射器件的设计与实现

姚永昭, 岳瑞峰, 刘理天.

仪器仪表学报, 25(4s):279-280, 2004.

提出了一种新型硅基垂直腔面光发射器件结构。它采用等离子增强化学气相淀积(PECVD)方法制备的非晶硅/二氧化硅交替生长的多层薄膜结构为布拉格反射器(DBR), 以夹在上下两个布拉格反射器之间的非晶碳化硅薄膜为中间发光层。通过设计与模拟, 分析了DBR中薄膜生长顺序与层数对器件性能的影响。根据设计制作了光致红光发射器件并测量分析了它的光致发光谱。

Design and Fabrication of Si-based Vertical Cavity Surface Light Emitting Device

Yao Yongzhao, Yue Ruifeng, Liu Litian

Chinese Journal of Scientific Instrument, Vol. 25, 2004

A novel Si-based vertical cavity surface light emitting device is proposed. a-Si/a-SiO₂ is fabricated periodically by PECVD as the distributed Bragg reflectors (DBR), while a-SiC:H thin film is fabricated between the bottom DBR and the top DBR by PECVD as the light emitting layer. The order of thin films of DBR is analyzed and determined by design and simulation. The photo-luminescent red light emitting device is fabricated, and its luminescence spectra is measured and analyzed.

电容式单芯片纹膜微传声器制备工艺改进

贾泽, 陈兢, 任天令, 刘建设, 刘理天

第八届全国敏感元件与传感器学术会议

对单片纹膜电容式微传声器的工艺设计进行改进, 将体硅微加工放在大部分的表面硅微加工之后进行。由此带来的以体硅腐蚀时硅片的正面保护和体硅腐蚀的控制等新的工艺问题。本文进一步探讨了黑胶, 704胶, 夹具三种方式进行硅片正面的保护的可行性; 以及实现湿法腐蚀的自停止的相关问题。这种工艺改进不仅可以保持微传声器在10V偏置电压下有7kHz下的平直频响, 40mv/Pa的开路灵敏度; 而且大大提高了工艺流程的稳定性和成品率。

Amelioration on Fabrication for Single-chip Corrugated diaphragm Capacitive Miniature Microphone

Jia Ze, Chen Jing, Ren Tianling, Liu Jianshe, Liu Litian

Chinese Journal of Scientific Instrument, Vol. 25, 2004

The process of single-chip condenser corrugated diaphragm miniature microphone is changed. The bulk micromachining of silicon is adapted to be performed after the surface micromachining of silicon, as will bring new fabrication problems, the protection for the front side of wafer when bulk wet etching and control of the bulk etching and so on. This article talks about the feasibility for three ways of Black Glue, No.704 Glue and clamp tool, and the relative problems about self-cease of wet etching. Not only the process adaption can keep flat frequency response under 7kHz within bias voltage of 10V and open circuit sensitivity of 40mv/Pa, but also the stability and production ratio of the microphone process will be improved.

铁电存储器及其关键集成工艺的研究

贾泽, 任天令, 谢丹, 张志刚, 刘理天

2004年全国博士生学术论坛

伴随信息时代的发展, 不挥发存储器将逐步成为主流, 铁电随机存储器(FeRAM)是利用铁电材料电滞回线双稳态性质实现数据存储的新型存储器, 具有不挥发、低功耗、快速读写、擦写次数高等多项优势。将铁电薄膜与CMOS工艺相集成是实现铁电存储器制备的关键所在。采用PZT材料的铁电随机存储器的工作原理、工艺流程, 以及铝连线在还原性氢气氛中退火对于铁电电容特性的影响在本文中被探讨, 尤其还原性气体隔离层的几种适用材料的特性, 以及隔离层制备的工艺集成这一关键问题被着重研究。

Study on FeRAM and its Pivotal Integration Process

Jia Ze¹, Ren Tianling¹, Xie Dan¹, Zhang Zhigang¹, Liu Litian¹

With the development of IT, non-volatile memory devices will become mainstream of memories. Among them FeRAM is a new memory which utilizes the double-stable-state property of ferroelectric materials hysteresis. It has the advantages of non-volatile, low power consumption, high write endurance and high-speed operation. The integration technology ferroelectric film and conventional CMOS process of the is the most important in the process for FeRAM. The principium, process and the influence for Al in H₂ ambience anneal about FeRAM utilizing PZT are discussed, especially, the properties of several types of materials for the hydrogen barrier layer and the integration technology for the barrier layer.

用于圆片级封装的金凸点研制

王水弟, 蔡坚, 谭智敏, 胡涛, 郭江华, 贾松良

半导体技术, 2004, (4): 27-30

介绍了电镀法进行圆片级封装中金凸点制作的工艺流程, 并对影响凸点成型的主要工艺因素进行了研究。凸点下金属化层(UBM, under bump metallization)溅射、厚胶光刻和厚金电镀是其中的工艺难点, 通过大量的实验研究, 确定了Ti/Au的UBM体系, 得到了优化的厚胶光刻工艺。同时, 研制了用于圆片级封装金凸点制作的垂直喷镀设备, 选用不同的电镀液体系和光刻胶体系, 对电镀参数进行了控制和研究。对制作的金凸点与国外同类产品的基本特征进行了对比, 表明其已经达到可应用水平。

Research of gold bump for wafer level package

Wang Shuidi, Cai Jian, Tan Zhimin, Hu Tao, Guo Jianghua, Jia Songliang

Semiconductor Technology, vol(4), 2004

A method of Au bump fabrication has been studied for wafer level packaging. The process flow of the bumping using electroplating is described. UBM sputtering, thick photoresist lithography and thick Au electroplating is got after experiments. A fountain-plating machine has been developed for wafer level Au bumping. Studies on the parameter of electroplating are also performed with different plating solutions and photoresist systems. A comparison between Au bumps fabricated and those of other vendors is made, which indicates the fabricated bumps could be used for application.

RF-MEMS的系统级封装

杨宇, 蔡坚, 刘泽文, 王水弟, 贾松良

半导体技术, 2004, (5): 45-48

射频(RF)技术在现代通信领域正得到越来越广泛的应用, 用MEMS方法制备的射频元件不仅尺寸、成本低、功能强大, 而且更利于系统集成。系统级封装(SIP)寄生效应小、集成度高的优点特别适合于封装RF-MEMS系统。本文介绍了系统级封装的发展现状特别是在射频领域的应用, 同时重点分析了在RF-MEMS系统级封装中封装结构、元件集成、互连及封装材料等几个关键问题。

Packaging a RF-MEMS system

Yang Yu, Cai Jian, Liu Zewen, Wang Shuidi, Jia Songliang

Semiconductor Technology, vol(5), 2004

Radio frequency (RF) technology is widely used in the field of modern communication. The components obtained through MEMS technologies are smaller in size, lower in cost, multifunctional, and lead to more compact integration as well. The SIP (system in a package) with lower parasitic effect and higher integration satisfy the RF-MEMS system. Packaging a RF-MEMS system is studied in this paper. Meanwhile, some key techniques related to RF SIP, including structure of package, integration of components, interconnection and package materials, are analyzed in this paper

中国的半导体封装产业

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中国集成电路, 2004, (4): 47-50

本文简要地介绍了中国已进入了半导体产业的快速发展期, 目前已占中国半导体产业产值50%以上的半导体封装产业的产值将在2006年进入世界半导体封装产业的第四位, 从而使中国成为世界半导体封装产业的重要基地之一。文中介绍了正在全面发展的中国半导体封装业的情况及存在问题。

The Semiconductor Packaging Industry in China

Songliang Jia, Shuidi Wang, Jian Cai

China Integrated Circuit, vol(4), 2004

The semiconductor industry of China has been in a rapid growth in this paper. The production value of China's semiconductor packaging industry becomes the 4th all over the world. China is becoming one of the important packaging manufacturing based. The situation and problems are also introduced in this paper.

高介电常数介质RF MEMS开关的制作研究

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测控技术, Vol.23, No.3, 2004.

本文报道了一种电容式MEMS开关的制造工艺。所有的步骤都采用表面微加工工艺完成。其中,区别于常规采用的 Si_xN_y 薄膜,我们采用了高介电常数的 $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{TiO}_3$ (BST)铁电薄膜作为开关的介电层,使“开”“关”状态电容比值大大提高,开关的插入损耗和隔离度性能得到提高。在制作工艺上,我们采用正胶作为牺牲层,并用发烟硝酸进行释放,获得了较好的效果。最终,我们制备了一种高性能的电容式MEMS开关。

Fabrication of a RF MEMS switch using high k materials as dielectric layer

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Measurement and Control Technology, Vol.23, No.3, 2004

This paper presents the study on fabrication process of a high k capacitive MEMS switch. The device is completed with modified surface micromachining technology. Instead of commonly used Si_xN_y , we use $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{TiO}_3$ (BST), a kind of high dielectric material, as insulating layer of the switch. As a result, the “on” “off” capacitance ratio is greatly increased, and the S parameter of switch is improved. Photoresist is utilized as sacrificial layer in the process, which is removed by fuming nitric acid. Based on the BST materials and the process, a high performance MEMS switch is realized.

自旋电子学和自旋电子器件

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微纳电子技术, 41(3), (2004)p1-5

自旋电子学是近年来发展起来的微电子学和磁学的交叉学科,主要研究自旋极化电流的注入、控制和检测。自旋电子学的研究有着重要的理论意义,自旋器件在信息科学领域也具有十分广阔的应用前景。本文介绍了自旋电子学和器件的研究进展,着重讨论了自旋注入和检测的问题,分析了自旋电子器件研究的核心问题和难点。

Spintronics and Spin electric devices

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Micronanoelectronic Technology, 41(3), (2004)p1-5

Spintronics which aims at injection, manipulation and detection of spin polarized current, is the new arising field combining microelectronics and magnetism. Research on spintronics has important theoretical value. Furthermore, spin electric devices have wide application potential in information field. In this paper, the progress of spintronics and devices, especially of spin injection and detection, is reviewed. Crucial problems and challenges of spin electronics are discussed as well.

UHV/CVD多晶锗硅及其电学特性

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微电子学 34(4),p418-424, 2004

采用自行研制的超高真空化学气相淀积(UHV-CVD)设备,研究了在 550°C