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光科学与工程系

Department of Optical Science & Engineering
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Annual Report

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课 题 进 展
Progress in Research Projects

Ⅲ－氮化物纳米颗粒的合成和光学特性研究

Syntheses of Ⅲ-nitride nano-particles and study on their optical properties

使用铟或铟镓合金作电极，采用氨氮混合气体进行脉冲放电合成了高纯的氮化铟和铟镓氮的纳米颗粒。用扫描电镜分析可知InN纳米颗粒的尺寸分布为5－200纳米。观察到了纳米氮化铟光致发光（PL）的蓝移，PL谱峰相对于其块状材料蓝移了0.54eV。通过氢原子和三维球势阱模型计算了纳米颗粒的量子束缚效应，计算结果表明，实验得到的发光蓝移是由强量子束缚效应引起的。用同样方法合成的铟镓氮纳米颗粒，其尺寸分布在8－50纳米范围。其PL发射带的中心波长在380纳米。由高斯拟合发现PL的发射光谱包含了一个很宽的带和一个较窄的峰叠合在一起。当泵浦功率增大时，其中较窄的峰有突然增强的趋势，呈现了受激辐射的特征。

High purity InN and InGaN nano-particles were synthesized by pulsed discharge of NH3/N2 mixture using In or the alloy of In and Ga as the electrode. The size distribution of synthesized InN was measured by SEM to be 5-200 nm. The blue shift of PL was observed, which was about 0.54eV as compared to the bulk material. The quantum confinement effect was calculated using two models. One is hydrogen-like potential and the other is spherically symmetric potential. The calculation shows that the blue-shift observed is due to the strong quantum confinement. Nano-particles of InGaN were synthesized by the same method but using the alloy of In and Ga as the electrode. The size distribution was in the region of 8-50 nm analyzed by AFM. The maximum of the PL band was at 380 nm. After Gaussian fitting, the PL spectrum can be decomposed into a wide band and a narrow peak. As the pump power increased, the intensity of the narrow peak increased drastically, showing the characteristic of the stimulated emission.

新型纳米金刚石薄膜的研究及应用
Multi-nucleation growth of nanocrystalline diamond film for optical applications

2002年完成热灯丝化学气相沉积金刚石薄膜制备系统的设备改造工作。新系统通过对金刚石薄膜生长表面激光反射率的原位实时检测，实现多光束干涉薄膜实时监控工艺，原位检测生长过程中金刚石薄膜表面的激光反射率，根据我们提出的数学模型，进行多参数非线性函数拟合，从而确定金刚石薄膜的光学折射率，生长速率，表面粗糙度演变过程，可精密控制金刚石薄膜的光学质量及几何参数。

开始研究纳米金刚石薄膜的制备，对纳米金刚石薄膜的各种光学及理化特性进行表征，以研制具有更优良透射性能的纳米金刚石窗口。

Chemical Vapor Deposition (CVD) diamond possesses a number of interesting physical and chemical properties: superior strength, extreme transparency, high thermal stability and conductivity, as well as high radiation tolerant and corrosion resistant. It has been considered as an ideal optical material. Because CVD diamond is a polycrystalline film, the surface roughness is always the problem in its optical applicatios. Therefor one of the main challenge is to deposite fine diamond films with high quality and smooth surface. In this present work, nanocryctalline diamond films were deposited by hot filament chemical vapor deposition (HFCVD) using CH4 and H2 mixture as gas source. Multi-nucleation steps and optimized deposition parameters were adopted to grow fine nanocrystalline diamond films with higher quality and smoother surface. High (4-6%) and low (1-2%) CH4 concentrations were fed into the deposition chamber during diamond nucleation and growth periods alternatively. In-situ reflectivity measurement was employed to monitor the surface morphology evolution process of the growing nanocrystalline diamond films. The nanocrystalinity, surface morphologhy and purity of the deposited diamond films were characterized by Raman spectroscopy, X-Ray Diffraction(XRD) , Scanning Electron Microscopy (SEM) and surface profiling.

The nanocrystalline diamond films deposited in our lab have a variety of optical applications such as an X-ray window for submicron lithography of integrated circuits and X-ray spectroscopy, particularly, for characteristic soft X-ray detection of light elements in the fields of X-ray astronomy, nuclear reactions and industry.

Keywords: Diamond growth and characterization, nanocrystalline diamond, nucleation, optical applications.

发明专利：

无依托超薄金刚石X光窗口及其制备工艺
申请专利号：2111270.3　　2002年4月

等离子体特性和应用、氮化物薄膜的制备和性质
Characteristics and Applications of Plasmas, Preparation and Properties of Nitride Thin Films

在继续进行等离子体特性和应用、基于III族氮化物的光电子薄膜和BCN系列功能薄膜材料的合成制备和性质研究的同时，开展了纳秒和飞秒脉冲激光烧蚀、纳秒和飞秒脉冲激光诱导等离子体的产生、演变等动力学过程的研究。通过时间和空间分辨的等离子体光谱测量和分析，考察了等离子体物质的空间分布和时间演变，观察到用这两种不同宽度的脉冲激光诱导产生的等离子体呈现完全不同的动力学过程。纳秒脉冲激光烧蚀所诱导产生的等离子体在初始阶段呈现激光维持等离子体的特征，等离子体始于激光脉冲对靶面的烧蚀，继而从烧蚀蒸汽的光学击穿和碰撞击穿向低能电子碰撞膨胀过程演化。飞秒脉冲激光烧蚀诱导产生无能量注入的等离子体，在演变过程中呈现单一的碰撞膨胀的特征。根据飞秒脉冲激光烧蚀诱导产生的等离子体光谱中连续谱弱、光谱分析灵敏度高的特点，开展了利用飞秒脉冲激光诱导等离子体光谱进行痕量元素探测分析的应用探索。

Researches are continued on the characteristics and applications of plasmas, preparation and properties of thin films of new optoelectronic materials based on III-nitrides and functional materials of BCN system. An investigation is performed on ns and fs pulsed laser ablation and on the dynamics of ns and fs pulsed laser induced plasmas. Through measurement and analysis of plasma emissions with temporal and spatial resolution, the space distribution and time evolution of the plasma composition is examined. Different dynamical processes are observed experimentally for the plasmas induced by ns laser pulses and fs laser pulses. The ns pulsed laser induced plasma appears to be a laser supported plasma in the initial stage. The plasma forms as the result of target surface ablation by a laser pulse, evolves from the optical and collision-induced breakdown of the ablation-created vapor, and to the cold electron collisonal expansion dynamics. The fs pulsed laser ablation induces a plasma with no energy deposition after its creation and the plasma exhibits the feature of a simple collisional expansion. By taking advantage of the weak continuum and the high sensitivity for spectrum analysis in the optical emissions of the fs pulsed laser induced plasma, an attempt was made to detect and analyze trace elements using fs pulsed laser induced plasma spectroscopy.

本年度发表论文9篇，完成国家自然科学基金项目3项，新获批准国家自然科学基金项目2项。

项目结题：

1. 国家自然科学基金项目“微波放电和激光烧蚀混合等离子体特性和应用”
2. 国家自然科学基金项目 “超短脉冲激光烧蚀动力学研究”
3. 国家自然科学基金专项奖励基金项目“激光溅射和ECR微波放电及离子源结合制备超硬薄膜”

2002年陆明课题组进展
The Annual Report of Lu Ming's group of 2002

本课题组建于2002年8月。目前共三个研究方向：
1）离子束辐射引发的半导体表面量子点阵列及其光学性质；
2）发光纳米晶体硅研究；
3）增强蓝宝石窗材料的高温机械强度。

由于相关设备到2003年3月才配齐并调试完毕，第一方面的工作目前刚开始。这方面工作已经申请《国家自然科学基金》和《教育部优秀青年教师资助项目》。

第二方面工作已经获得两方面结果，即首次观察到纳米晶体硅的表面等离子体振荡引发的光散射；以及结构缺陷和纳米晶体硅发光之间的关联。目前拟发表论文2篇。这方面工作已经申请《国家自然科学基金》（与物理系合作）。

第三方面工作有待项目落实后，再着手展开。这方面工作已经申请《航天科工集团预研基金》，专家反映良好，有望在2003年6月获得支持。

This group was established in August, 2002. We are working on:
1) ion-erosion-induced quantum dot arrays and their optical properties;
2) light-emitting of Si nanocrystals;
3) Enhancement of mechanical properties of sapphire at high temperatures.

The first research is just at the beginning at present because of the delayed delivery of the relevant setup and the subsequent testing. This work has made a major part in the applications of "National Natural Science Foundation" and "Excellent Young Teacher Research Program of Chinese Education Ministry".

We have obtained two major results from the second research subject, i.e. observations of light scattering induced by the surface plasmon polarions on nc-Si, and correlation between the structural defects in SiO2 and the light-emitting efficiency of nc-Si. Two publications are in preparation. This work has made a major part in the application of "National Natural Science Foundation" in cooperation with Fudan Physics Department.

We will set to conduct the third research after the funding comes. Support from "Space Science and Industry Group Foundation" has been attempted, and the referee's comments on our project are good. The funding is expected to arrive in June of 2003.

玻璃基质光波导：材料、物理与器件
Glass optical waveguides: materials, physics and devices

光子芯片以光波导、光学微腔等具有一定功能的微小光学光路为研究对象，不同功能的微小光学光路的集成（称为集成光学，或集成光子学）是取代体光学光路的必由之路，也是人们所追求的终极目标。本课题组的工作是探索功能玻璃材料作为光子芯片应用的可能性，研究涉及材料的性能、微结构和微图形及光子学器件。

Photonic chips are miniature optical circuits of waveguides and microcavities. Integration of circuits that have different functions will eventually replace bulk optical components, just like integrated circuits of micro-electronics replaced discrete electronic components and changed our normal life. Our group focused on functional glassy materials, exploring the possibility of using these materials as part of photonic chips. Our research covers material characterization, micro-patterning technique and prototype photonic chip devices.

1. 有机/无机复合材料热光开关器件的制备。Fabrication of thermo-optic switches with organic-inorganic hybrid material.

   用溶胶-凝胶技术制备了有机/无机复合材料光波导，通过棱镜耦合法测量了复合材料的热光系数，达-1.44×10^{-4}/℃, 和聚合物材料相当。用该复合材料制备了2×2 Mach-Zehnder型热光开关器件，开关响应时间为毫秒量级，开关功耗为9mW，开关对比度高于18dB。

   Organic/inorganic hybrid glass waveguides were fabricated by the sol-gel technique followed by direct UV patterning. The thermo-optic coefficient (dn/dT) of the hybrid material was measured by a prism-coupling method and was found to be -1.44×10^{-4}/℃, comparable to those of typical polymer materials. In order to investigate the possibility of using this hybrid glass material as a thermo-optic waveguide material, a 2×2 Mach-Zehnder interferometric optical switch was fabricated on a silicon wafer. At the wavelength of 1.55 μm, the switch response time was measured to be less than 4.2 ms, and the switching power was 9.3 mW. Experimental results show that this hybrid material is very suitable for application in integrated thermo-optic components.

2. 光学微腔研究。Study on optical microcavity fabricated by sol-gel technique.

   用溶胶-凝胶技术在不同直径的光纤外制备了有机染料掺杂的聚合物光学微环，所制备的光学微腔质量好，可观察到明显的回廊耳语模式。光学微环的Q值经测量高达1500，是我们知道的有机染料掺杂的聚合物光学微环Q值最大的。

   RhB-doped PMMA thin film was coated around the fiber by dip-coating method to fabricate a high quality microring around the fiber. The fluorescence spectrum of microring was studied, which showed the typical fluorescence signal below

pumping threshold and the whispering gallery mode (WGM) above the threshold. Different laser emission spectra were obtained for microrings on fibers of different diameters, which could be explained well by the modulation of whispering gallery mode and waveguide mode. A Q value as high as 1500 was obtained, which, to our knowledge, is the highest Q value obtained in the dye-doped polymer microring measured ever since.

3．玻璃材料二阶光学非线性研究。Study on the second-order nonlinearity of glasses.

研究了硼酸铅玻璃体材料的光学二阶非线性极化条件的关系，并对其产生的机理做了初步的研究。对硼酸铅玻璃样品（J*PbO/B_2O_3）进行了热辅助的平板电场极化，光学二次谐波产生测量发现不同组分（J=0.43、0.54、0.74、1.00、1.86）样品的最佳极化温度T_p不同，T_p随组分J的增大而减小，并且最佳极化温度(T_P)与玻转温度(T_g)之间满足一定的关系，$T_g - T_p \cong 50°C$；对组份J=0.43的样品进行了细致研究，发现样品的二次谐波信号强度随着极化电压的增大而增大，并满足幂函数关系，$I \propto V^t$，t=2.4，利用已提出的有效偶极子释放模型解释了样品的二次谐波信号强度与极化电压之间的超平方关系。

Second Harmonic Generation (SHG) of the bulk J*PbO/B_2O_3 glass samples were studied after thermo-poling. For samples with different compositions of J=0.43, 0.54, 0.74, 1.00, 1.86, an optimal poling temperature T_p was found to fall as J increases. And a relation between optimal temperature (T_p) and glass transition temperature T_g was found to be $T_g - T_p \cong 50°C$. SHG intensity measurement showed a super-quadratic relation with the poling voltage of the bulk (J=0.43) PbO/B_2O_3 glass ($I_{SHG} \propto V^t$, t=2.4). A model of the induced dipoles was proposed for explanation.

4．飞秒激光照射激光玻璃导致色心产生的机理研究。Study on mechanism of color center formation in laser glasses irradiated by femtosecond laser.

掺钕硅酸盐玻璃和磷酸盐玻璃在飞秒激光照射下会产生色心，通过ESR测量和紫外－可见吸收光谱的测量，我们研究了色心的种类和产生条件的差异，并通过和纳秒紫外激光照射下的对比研究，对色心的产生机理进行了初步探索。

A kind of Nd-doped silicate laser glass and two kinds of Nd-doped phosphate laser glasses N_{21}& N_{31} were used in experiments to study color centers formation by irradiation of IR-femtosecond laser and UV-nanosecond laser. UV-visible absorption spectrum and ESR measurements showed that different color centers were formed in these glasses after irradiation. From the experiments, it is also showed that silicate laser glass is darkened easier than the two kinds of phosphate laser glass, and the N_{21} laser glass is darkened easier than the N_{31} laser glass. The results of color center formation in glasses irradiated under different laser system and possible mechanism for color center formation are discussed.

2002年度本课题组完成上海市科学发展基金项目1项，通过上海市科委组织的鉴定。2002年新申请到基础研究重大项目前期研究专项子课题1项，国家自然科学基金项目1项，上海市科委重点项目子课题1项。2002年度课题组在国内外刊物上正式发表文章5篇；在国际会议上报告5次，其中邀请报告1次；在国内会议上报告3次。

信息存储光折变聚合物材料及光学性质研究
The Optical Properties in Optical Data Storage Polymer Composite

1. 研制了以分散红为二阶非线性生色团，PVK-PBA共聚物为电荷传输体系，TNF为光敏剂的有机光折变聚合物。在二波能量耦合实验中测得其耦合光折变增益达到475cm^{-1}。在此材料的基础上又发展了二苯胺二阶非线性生色团的光折变聚合物。在零点场时发现二苯胺的光折变效应优于分散红材料，表明这是一种更有潜力的光功能材料。

   The investigation on the photorefractive polymer composed with DRI: PVD-PBA: TNF is performed. In this composite, PBA (poly-butylacrylate) as plasticizer, is polymerized to PVK with a weight ratio 1:2 (PBA: PVK), and DRI (disperse red 1) is chosen to be the electro-optic chromophore. By the two-beam coupling experiment, the coupling gain coefficient as a value of 470cm-1 is measured at electric field of 25v/ μ m. On the base of above study; a new photorefractive polymer with electro-optic chromophore of AZOPA is developed. The photorefractive effect of AZOPA polymer is much better than that of DRI, which indicates that is a potential optical function material in photonics.

2. 对有机化合物ZnTBP/CA/PhR体系的薄膜样品在可见光范围进行了光吸收谱测定，观察到此种材料的饱和吸收及反饱和吸收现象，还首次观察到它的再反饱和过程。其光学性质表明此种材料不仅在频率域光信息存储可得到应用，而且将可用于制备性能优良的光限制器件。

   The absorption spectrum of organic material of ZnTBP/CA/PhR is measured invisible range under room temperature. A reverse saturable absorption and an enhanced second reverse saturable absorption named as re-reverse saturable absorption are observed for first time. The optical properties observed indicate that the material could be applied in optical information storage at frequency domain and in developing of optical limiter with high performance.

功能薄膜材料的光物理特性研究
Studies on Optic-physical Properities of Functional Film Materials

(1) 通过化学合成和掺杂调控等技术获得了一系列共轭有机分子和聚合物激光增益介质，测量获得了激光输出的相关参数，与典型的有机激光染料六丹明相比，具有更高的荧光效率和更大的激光泵浦斜率，且调谐范围达30nm以上。在此基础上将其掺杂制备成具有良好透光性的溶凝胶薄膜，并对微片激光原型器件进行了探索研究，为今后制备半导体泵浦的有机薄膜微片激光器件打下了基础.

We've got a series of laser gain medium of conjugated organic molecules and polymer by chemistry synthesis and sophisticated modulation technology et.al., and we also obtained the correlative parameters of laser output. Compared with the typical organic laser dyes Rhodamine-6g ， they process higher fluorescence efficiency and greater laser pump slop， what's more, their turning range is beyond 30nm. Therefore, we mix them up to prepare the sol-gel thin film with excellent light permeability and explored the original devices of micro-cavity laser, grounding the preparation of organic film micro-slice laser devices of semiconductor pump

(2) 建立了实时测量全光极化二次谐波产生的实验系统，开展了偶氮类染料溶液全光极化二次谐波产生的实验，并取得初步结果。

The experimental system that real- time monitor all optical poling SHG has been set up. We obtained initial results of optical poling SHG of azobenzene compound solutions.

金属表面吸附原子及团簇的扩散动力学研究

Studies on self-diffusion of adatoms and adatom clusters on metal sufaces

1．在弱场条件下， 研究了光折变振荡器中横向耦合对时空稳定性的影响，给出了不同情况下光学斑图稳定的条件。在此基础上，通过数值模拟研究了系统偏离稳定条件时所表现出的时空不稳定现象，以及系统通向混沌的途径。

2．采用原子嵌入方法的分子动力学研究了吸附二聚物在金属 fcc (001)表面的自扩散现象。除了一般的交换扩散过程外，模拟发现吸附二聚物还可以通过一种有趣的交换旋转过程进行扩散。其中有一个吸附原子引发的交换过程会在一系列的表面原子间发生，并表现为一种集体的旋转。通过与单个吸附原子扩散机制的比较，我们发现它源于单个吸附原子的复杂交换过程。

3．采用遗传算法系统地研究了由原子嵌入势描述的金属 fcc(111)表面吸附团簇的最低能量结构。发现不同表面的各种最低能量结构可以用相对作用长度以及原子-衬底相互作用来描述。相对作用长度越长, 最低能量结构就变得越尖锐，其中次近邻键数减小。当来自原子--衬底相互作用的补偿效应增强时，近邻键数较小的结构可能成为能量最小，结构形状变得更尖锐。

1. The effect of transverse coupling in a photorefractive oscillatoris studied. From the study the condition for stable optical patternsof multimode oscillation is given analytically and verified by numerical simulation. Out of the stable condition, the period-doubling route to spatiotemporal chaos is observed.
2. Self-diffusion of dimers on several metal fcc(001) surfaces is investigated by molecular-dynamics with the embedded-atom method potentials. Besides the conventional exchange diffusion process, another interesting mechanism namedexchange rotation is observed, in which the place replacement induced by one adatom occurs among several substrate atoms and leads a collective rotation around another adatom. Comparing with the diffusion mechanisms of single adatom, we find that the two kinds of complicated exchange processes could account for such rotation mechanism.
3. With a genetic algorithm, the structure of adatom clusters is optimized and studied systematically on different metal fcc(111) surfaces modeled by embedded atom method(EAM). It is found that the various lowest-energy structures on the different surfaces can be explained in terms of the relative interaction range and the adatom-substrate interaction. The longer the relative interaction range becomes, the sharper or more extended the shape of the lowest-energy structure tends to be, in which the number of the next nearest-neighbor bonds decreases. When the compensation effect from the adatom-substrate interaction becomes strong, the configuration with less number of the nearest-neighbor bonds could be the lowest-energy structure, it also induces the shape of the lowest-energy structure being sharp or extended

金属和金属氧化物的光学性质研究

Studies on the optical properties of several metals and metallic oxides

1. 完成了从德国莱宝公司进口的离子束溅射镀膜设备的安装调试，并开展了多种金属、氧化物和贵金属和氧化物的复合材料的制备和性质研究。
2. 氧化银由于其独特的特性，在光学和磁光存储及电子工业方面具有潜在的应用价值。因此我们研究了氧化银薄膜制备方法和其热分解温度以及其光学性质，获得制备氧化银的工艺条件和各种光学参数，发现所有制备态的样品都为无定型结构；AgO和Ag2O的分解温度分别为200和300度；在氧氩比为0.5—0.6时在632.8nm处的光学常数不随溅射气压的变化而变化。
3. 研究了银和氧化物组成的复合薄膜的光学性质，获得了这类材料的光学吸收特性，发现其吸收峰随银含量的增加而发生红移，在确定的Ag含量条件下，吸收峰随Ag颗粒尺寸的增加而发生红移。因此吸收峰的位置不仅依赖于Ag的含量，而且也依赖于Ag颗粒的尺寸。
4. 完成了上海市科技发展基金项目：“DWDM滤光片的研制”，已通过上海市科委组织的鉴定。
5. 本年度获国家自然科学基金两项，承担上海市科委重大项目一项。获得教育部提名国家技术发明奖一项。

1. New sputtering equipment has been built, it was imported from Leybold optics in Germany. Several kinds of metals and their oxides were prepared, the optical properties were studied
2. Silver oxide has been studied extensively due to its important applications in the electrical, optical and magneto-optical storage industries. The prepared method and properties of the silver oxide depends on the thermal decomposition process was studied . The structures and optical properties of the AgO_x samples as-deposited by the reactive sputtering with annealing process were investigated by the spectroscopic ellipsometry method with the x-ray diffraction and x-ray photoelectron spectroscopy analysis. Results show that: (1). As-deposited samples almost have an amorphous structure; (2). The threshold of decomposition temperature of AgO and Ag_2O are about 200℃ and 300℃, respectively; (3). The optimal gas ratio ($O_2/(O_2+Ar)$) is in the range of 0.5-0.6, in which optical constants almost become constant at the wavelength of 632.8nm.
3. The optical properties of granular films compose with the novel metal(Ag) and the several oxides were studied, it was found that the optical absorption was related to the surface plasmon resonance of Ag particles were observed. With increasing the Ag concentration, the peak absorption increased and shifted to

longer wavelength (red-shift). For given Ag concentration, the absorption peak was also shifted as the increasing of the particles size. The red-shift was not only depend on the Ag concentration, but also depend on the particle size is different.

4. Fulfilled the project of “Research and development of the DWDM filter”, which was supported by the Science and Technology Committee of Shanghai Municipality.
5. The group has applied two research projects as supported by the National Natural Science Foundation of China. Attended a key project supported by the Science and Technology Committee of Shanghai Municipality. One project was prized by the ministry of education for the first grade of State Award for technological invention nominated by Ministry of education of China.

新型液晶光电子器件的研究
Investigation for novel electrooptical device of liquid crystal

1. 新型液晶空间光调制器研制 Study of new type of liquid crystal spatial light modulator

   我们研制了基于硅的液晶（LCOS）相位调制器，它有1024×768个像素，相当于55线/mm的分辨率，刷新频率为60Hz，在计算机控制下，可实现可见光的相位调制，相位调制时伴随的振幅变化小于10%。我们也初步研究了LCOS振幅调制器，它的对比度为140：1，其它参数如像素数、分辨率、刷新频率与LCOS相位空间光调制器相同。

   We have developed LCOS(Liquid Crystal on silicon) phase spatial light modulator with 1024×768 pixels, its resolution is 55 lines/mm, the refresh rate is 60 Hz. Under the control of computer, the phase modulation can be realized in visible range. The amplitude variation accompanied by phase modulation is less than 10%. A LCOS amplitude spatial light modulator also has been developed preliminary, its contrast is 140:1, and other parameters such as pixels, resolution and refresh rate are equal to the parameters of LCOS phase SLM.

2. 全息聚合物分散液晶光开关研究 Study of Holographic Polymer Dispersed Liquid Crystal Optical Switch

   全息聚合物分散液晶（HPDLC）是一种新的光电信息材料，我们研究了聚合物折射率、爆光强度、时间、温度以及液晶含量对衍射效率的影响，获得了最佳条件，其衍射效率达80%。我们研制了一个2X2的HPDLC光开关，它的对比度为20db，阈值电压为5v/μm, 开关电压为27 v/μm, 上升时间为36μs，下降时间为160μs。

   Holographic Polymer Dispersed Liquid Crystal（HPDLC）is a kind of novel photoelectronic information material, we investigated the dependence of diffraction efficiency on the refractive index of the polymer, exposure intensity, time and curing temperature, and liquid crystal loading. The best condition were found. Now the highest diffraction efficiency was 80%. We have fabricated a 2X2 HPDLC optical switch, the contrast ratio is 20db, threshold voltage is 5v/μm, operating voltage is 27 v/μm, the rise time is 36μs，decay time is 160μs。

3. 完成一项国家自然科学基金:“实用化的电寻址铁电液晶空间光调制器研制”。

4. 获863、国家自然科学基金等4项资助。

低维磁结构的磁性和非线性光学响应
Magnetic properties and nonlinear optical response in low-dimension magnetic structures

① MBE设备的进一步完善，完成了超高真空中wedge的生长装置，实现一次可以生长出厚度渐变的样品，效率大大提高且更具系统性，并可由此生长含两种膜层的double wedge，进而在一个样品上得到两膜层各种不同厚度的超薄膜结构，实现了薄膜生长效率几十倍的提高。

An apparatus for wedge and double wedges' growth was finished, largely increasing the efficiency of the sample growth in series.

② 利用RHEED、LEED、表面磁光克尔效应（SMOKE）等手段，研究了两个超薄多层结构的自旋重定向,并讨论了超薄情况下的磁晶、表面/界面各向异性。在4-11 ML的Fe外延薄膜上覆以超薄Ni层，大约在0.2 ML左右发生了易磁化方向从垂直向平行转变；在极薄Co层（小于2 ML）上生长Fe超薄膜，发现与厚Co（如6 ML）的情形极不相似，其转变厚度随底层Co的厚度很敏感，并在低温下有不同表现。这两部分工作已投出论文。

Using the method of SMOKE, the growth and the spin reorientation transition (SRT) of Ni-capped (at 100 K), Co-underlayered (at 110 K ans room temperature) Fe ultrathin films were studied. The out-of-plane magnetization rotated to in-plane when increased the Ni capping layer thickness due to the surface modification and the competition of anisotropies. The explolation of each cases with different Fe thickness to zero Ni thickness gave a critical thickness at about 4.3 ML for the thickness-driven spin reorientation for Fe on Cu(001); With the increase of Co thickness, the critical thickness of Fe at which the SRT took place from out-of-plane to in-plane decreased. An outlined phase diagram and a theoretical fitting were given.

③ 完成大气中磁光克尔效应MOKE和磁诱导光学二次谐波MSHG的Pump-Probe测量装置的搭建，对平行磁化Co薄膜和TeFeCo磁光薄膜的自旋动态弛豫过程进行了探测。

The experimental setup of the pump-probe measurement in femtosecond scale for magnetic films was finished. Two experiments were taken to study the spin dynamics of a thick Co film and TeFeCo film.

本年度发表和接受SCI论文各1篇。

Two papers were published and accpted.

飞秒时域的非线性光学研究
Investigation on nonlinear optics in femtosecond time scale

群速度色散（GVD）和非线性效应是飞秒光学中的两个最基本的物理过程。飞秒激光具有与其它长脉冲本质上不同的两大特征：⑴线性传输的色散效应。大多数介质在飞秒时间尺度开始显示色散效应，如 1cm 的光学玻璃将使 100fs 的脉冲色散展宽至约 200fs。而对于更短的周期量级飞秒脉冲，气体的色散也必须被计及，如 3m 的空气将使 5fs 的脉冲被展宽至约 15fs；⑵非线性效应更严重。脉冲能量仅为 mj 量级的飞秒激光的聚焦光场就已经很容易超过原子的库仑内场，从而将激发众多的非线性过程，有时甚至应该考虑相对论性效应。我们主要着重研究了基于$\chi^{(2)}$过程的非线性问题研究。对非线性的认识、掌握和控制，将为飞秒光学的突破性工作提供源动力。我们在这方面做了大量的工作，今年的工作总结如下：

1. 基于非线性过程实现了飞秒脉冲的时间望远镜Temporal Telescope based on nonlinear approaches

研究了具有脉冲扩展功能的时间望远镜系统，时间望远镜主要是利用啁啾脉冲非线性参量转换过程实现的，它具有较高的转换效率和输出付氏变换极限长脉冲的特点。理论研究和数值模拟计算发现非线性晶体的群速度失配是造成时间像差和转换效率下降的主导因素，在此基础上我们提出了时间望远镜系统在设计中所应遵循的基本准则，成功地在实验上将70fs光脉冲扩展成了近付氏变换极限的60ps长脉冲。

We have theoretically investigated time telescope that offers a function of pulse expanding. Time telescope, with features of high efficiency and near Fourier-transform limited, is constructed mainly by using nonlinear parametric conversions of chirped pulses. Based on both analytical and numerical studies, it is found that group-velocity mismatch (GVM) of the nonlinear crystal plays a big role on temporal aberration and conversion efficiency, and the criteria for designing a near aberration-free telescope are summarized. Finally it is experimentally demonstrated that a 70-fs short pulse is expanded to a 60-ps long pulse near Fourier-transform limited.

2. 飞秒脉冲传输工作取得多项进展Progress on propagation of femtosecond lasers
   - （1） 建立了亚周期脉冲在色散介质中传输的理论模型
     Modeling of sub-cycle pulsed laser in dispersive medium.
   - （2） 研究了飞秒脉冲在微结构光纤中非线性传输和白光产生
     Investigation on MI and white-light generation of femtosecond lasers in micro-structured fibers

（3） 高功率飞秒激光大气非线性传输取得实质性进展
Achievements about nonlinear high-power laser propagation in air.

3. 研制了半导体激光泵浦飞秒Cr:LiSAF激光器Diode-pumped femtosecond Cr:LiSAF laser

在国内第一次实现了高功率 (200mW) 输出的飞秒Cr:LiSAF激光。并且首次应用了拓展功率的创新思想和措施，使得Cr:LiSAF激光的技术指标可以和传统的钛宝石激光相竞争。

Employing innovative approaches for power scaling, femtosecond highpower diode-pumped Cr:LiSAF laser was developed, whose performance is comparable with that of Ti:sapphire laser.

本年度课题组完成了第一期的实验室建设，形成了多档规模不同波长的飞秒光源，并拥有完善的飞秒激光和非线性光学研究条件。在JOSA B, PRE 等刊物发表论文10余篇。新申到863和国家自然科学基金课题4项。

2002年孙迭篪组研究进展
Research progress in 2002

1 研究了用布拉格光纤光栅作反射器的掺镱光纤激光器,发现了激光振荡波长相对于光纤光栅的反射中心有一个红移的现象.通过实验与光纤光栅的反射特性和热效应,与光纤的偏振特性无关,采用激光增益线型的理论进行了分析,与实验结果相一致. 由此的出,这一激光振荡波长的红移和掺镱光纤的增益特性有关. 同时还观察到在一定的泵浦功率和光纤长度时,光纤激光器出现自锁模, 对这一现象进行了实验研究和理论分析.得出了自锁模是泵浦光不高的条件下, 掺镱光纤中有一部分没有完全被泵浦而类似于饱和吸收体,从而使光纤激光器形成自锁模.实验表明,自锁模有一个确定的泵浦功率范围.

2 研究了一个用光纤光栅的双程掺镱光纤放大器, 其小信号增益系数可达到32分贝, 研究了在输入光信号为连续和脉冲条件下的运转特性.

3 研究了一个高效率可调谐掺镱双包曾光纤激光器,在泵浦光为915nm,功率为1瓦条件下,掺镱双包层光纤激光器的输出功率440mW,输出斜效率达80%.输出光束的M2 因子为x方向1.06, y方向1.04.用一光栅作为输出耦合,输出波长可在1070-1150nm 的范围内调谐.如进一步提高泵浦功率,可望得到更高的输出功率,用于光纤拉曼激光器和放大器的研究.

4 研究了一个用光纤回路镜组成的运转在新1240nm的新型级联光纤拉曼激光器, 用1064nm作泵浦源,入纤功率1.2瓦时,1240nm的输出功率为300mW,光-光转换效率约25%. 为进一步开展光纤拉曼放大的设计提供了依据.

1, A lasing wavelength red shift from the reflection center of fiber Bragg grating in a Yb doped fiber laser has been observed. The wavelength shift is about half of the fiber grating bandwidth and it is not depend on the temperature or the reflection of fiber grating. Theory of lasing gain profile is used to explore this wavelength shift and it is well coincided with the experimental results. Under a certain pump power and fiber length a self mode-locking has been observed. The characteristics of self mode-locking are investigated. The mechanism of self mode-locking can be understand as a saturable absorber due to the not completed pumping Yb doped fiber.

2, A double pass Yb doped fiber A\amplifier using a fiber grating has been constructed. The small signal amplified gain is great than 32dB has bee obtained. The properties for both CW and pulse input are studied in experimentally.

3, A tunable Yb doped double cladding fiber laser with high efficiency has been investigated. The output power of the fiber laser was about 440mW using 1W 915nm LD pumping and the slope efficiency was about 80%. The M2 factor of output beam profile in both directions was 1.06 and 1.04, respectively. The output wavelength can be tuned from 1070nm-1150nm while using a grating as output coupler.

4, A novel cascaded fiber Raman laser operating at 3rd Stokes 1240nm using fiber loop mirror is studied The output power at 1240nm is about 300mW and convert efficient is about 25%, however, the quality of the fiber mirror and the parameters of Raman fiber are not optimized. That fiber Raman laser will be used as pump for a fiber Raman amplifier.

申请专利(已受理):

02261363.1基于光纤回路镜的分列式光纤拉曼放大器
02279915.X用于1310纳米波段的三级串联拉光纤曼激光器
02279914.1用于1310纳米波段的二级串联光纤拉曼激光器
02279913.3用于1310纳米波段的一级串联光纤拉曼激光器
02279909.5用于1550纳米波段的一级串联光纤拉曼激光器
02279910.9用于1550纳米波段的二级串联光纤拉曼激光器
02279908.7用于1550纳米波段的三级串联光纤拉曼激光器
02279912.5用于1550纳米波段的二级串联掺磷光纤拉曼激光器

8 Patents accepted

在研课题和经费
Projects & Budgets

光敏增强共轭有机高聚物超快全光调制特性研究
负责人: 刘建华, 起止年月：1999.1-2002.12
拨款来源：国家基金 19804003 (13万)

实用化的电寻址铁电液晶空间光调制器研制
负责人: 徐克璿, 起止年月：1999.1-2002.12
拨款来源：国家基金 69877004 (40万)

光电功能分子电荷转移动力学及光电特性（重点）
负责人: 李富铭, 起止年月：1999.1-2002.12
拨款来源：国家基金 19834030 (85万), 2002年到款8.5万

超快脉冲激光烧蚀动力学研究
负责人：应质峰, 起止年月：2000.1-2002.12
拨款来源：国家基金19974009 (14.5万) , 2002年到款4.35万

微波放电和激光烧蚀混合等离子体的特性和应用
负责人：吴嘉达, 起止年月：2000.1-2002.12
拨款来源：国家基金 19975012 (15.0万) , 2002年到款4.5万

快脉冲放电制备尺寸可控纳米III族氮化物及光学特性研究
负责人：王培南, 起止年月：2000.1-2002.12
拨款来源：国家基金69978005 (14.0万) , 2002年到款4.2万

有机半导体微片激光器的制备及其特性研究
负责人：徐建华, 起止年月：2000.1-2002.12
拨款来源：国家基金69978004 (13.5万) , 2002年到款4.05万

磁性体系的超快过程，线性和非线性磁光效应
负责人：金庆原, 起止年月：2000.1-2002.8
拨款来源：国家教育部优秀年青教师 (8万)

磁性超薄多层膜的光学非线性技术研究
负责人：金庆原, 起止年月：2000.7-2003.6
拨款来源：国家教育部重点项目 (13万)

特殊结构和大分子体系中的非线性效应和超快探测
负责人：金庆原, 朱鹤元，起止年月：2000.1-2002.8
拨款来源：973分课题 (16万)

OPCPA相关技术研究
负责人：朱鹤元，起止年月：2000.10-2002.10
拨款来源：863-416-2,3,1 (5万)

光学空间花样的形成及控制
负责人：庄军，起止年月：2000.1-2002.12
拨款来源：校基金(2万)

光学二阶非线性级联效应及光子器件的研究
负责人：侯占佳，起止年月：2000.10-2002.12
拨款来源：校基金(5 万)

光致极化反转效应研究
负责人：李富铭，朱鹤元，起止年月：2000.9-2002.9
拨款来源：校基金(8 万），市科委基金（3 万）

新型面阵式高密度光盘数据存储和阅读方法研究
负责人：张荣君，起止年月：2000.10-2002.12
拨款来源：校基金(5 万)

光通信滤波片光波导热光效应及器件研究
负责人：刘丽英，张荣君，起止年月：2000.7-2002.6
拨款来源：市科委基金 00JC14029（30 万），2002 年到款 3 万

低能氮离子注入金刚石薄膜的氮化改性研究
负责人：王培南, 起止年月：2001.1-2003.12
拨款来源：国家基金10075012 (21万) ，2002年到款6.3万

新型液晶全息光交换开光研究
负责人:徐克璹, 起止年月：2001.1-2003.12
拨款来源：国家基金 60077003 (16万) ，2002年到款4.8万

玻璃态材料光敏性的来源与增强机理
负责人:王文澄, 起止年月：2001.1-2003.12
拨款来源：国家基金 10074011 (22万+3.9万国际合作) ，2002年到款6.6+3.9万

有关表面及表面吸附原子操纵的若干动力学问题研究
负责人: 庄军, 起止年月：2001.1-2003.12
拨款来源：国家基金 10004002 (15万) ，2002年到款4.5万

用于宽带光通信的光纤维拉曼放大器研究
负责人: 孙迭篪, 起止年月：2001.1-2003.12
拨款来源：国家基金 60077005 (18万) ，2002年到款5.4万

低微磁结构的光学响应和自旋动力学过程研究
负责人: 金庆原, 起止年月：2001.1-2004.12
拨款来源：国家杰出青年基金 (80万) ，2002年到款24万

跨世纪优秀人才培养计划
负责人：吴嘉达, 起止年月：2000.1-2003.12
拨款来源：国家教育部 (30万)

掺铒凝胶玻璃光波导的结构光学性质
负责人：王文澄, 起止年月：2001.1-2003.12
拨款来源：博士点基金 (7万) ，2002年到款3.2万

新型光学非线性有机、无机复合材料及其应用研究
负责人：侯占佳, 起止年月：2001.1-2002.12
拨款来源：上海AM基金 (20万) ，2002年到款6万

高能皮秒级脉冲的线性色散和非线性B积分控制
负责人：钱列加, 起止年月：2001.1-2003.12
拨款来源：国家基金 60088003 (13.21万) ，2002年到款3.96万

神光III总体技术可行性研究
负责人：钱列加, 起止年月：2001.1-2005.12
拨款来源：863-804北京总装备部 416-5-1-11(150万) ，2002年到款配套3万

飞秒光脉冲基本物理问题的研究
负责人：钱列加, 起止年月：2001.1-2003.12
拨款来源：973 G19990752023 (15万)

基于网络的实验仪器远程测控分析
负责人：陈良尧, 起止年月：2001.1-2002.12
拨款来源：国家教育部（40万）

高数值孔径下磁光多层膜系统的光学与热分析
负责人：郑玉祥, 起止年月：2002.1-2002.12
拨款来源：国家基金 60177031 (5万) ，2002年到款5万

金刚石软X光滤波器的研制及其应用
负责人：应萱同, 起止年月：2002.1-2004.12
拨款来源：国家基金 60178031 (17万) ，2002年到款6.8万

全光极化的准相位匹配有机非线性光波导研究
负责人：王恭明, 起止年月：2002.1-2004.12
拨款来源：国家基金 60178030 (17万) ，2002年到款6.8万

液晶相位调制器研制及特性研究
负责人：徐克璹, 起止年月：2002.1-2004.12
拨款来源：国家基金 10176007 (15万) ，2002年到款6万

共轭聚合物分子中光致极化反转效应的研究
负责人：朱鹤元, 起止年月：2002.1-2004.12
拨款来源：国家基金 10104006 (22万) ，2002年到款8.8万

高性能小型全固化飞秒激光器
负责人：钱列加, 起止年月：2002.1-2005.7，　　2001年已到款20万
拨款来源：上海市科委光科技专项012261065 (50万) ，2002年到款25万

可变光衰减器
负责人：徐雷, 起止年月：2002.1-2004.12，　　2001年已到款20万
拨款来源：上海市科委光科技专项012261025 (40万) ，2002年到款10万

光纤放大器
负责人：孙迭篪, 起止年月：2002.1-2003.12，　　2001年已到款14万
拨款来源：上海市科委光科技专项012261031 (20万) ，2002年到款4万

新型液晶全息光交换开关的研制
负责人：张斌, 起止年月：2002.1-2004.12，　　2001年已到款15万
拨款来源：上海市科委光科技专项012261009 (25万) ，2002年到款5万

LCOS液晶涂层工艺研究
负责人：徐克璹, 起止年月：2002.1-2003.12
拨款来源：AM基金 0106(15万) ，2002年到款7.5万

新型液晶光调制器研制及特性研究
负责人：徐克璹, 起止年月：2002.8-2003.7
拨款来源：863-804-2-12, 2002AA84TS11(20万) ，2002年到款20万

强激光束非线性传输模拟
负责人：王韬, 起止年月：2002.1-2005.12
拨款来源：863-804-5-3.3, 2002AA845033(40万) ， 2002年到款8万

新概念光学信标单元技术研究
负责人：王韬, 起止年月：2002.7-2003.12
拨款来源：863-703 (30万) , 2002AA731061

级联非线性在高能激光驱动器技术创新中的应用
负责人：朱鹤元, 起止年月：2002.1-2005.12
拨款来源： 863-804-5-20，2002AA845180(10万) ， 2002年到款10万

关键光学材料的特性研究
负责人：王培南, 起止年月：2002.7-2003.6
拨款来源：863-416总装备部2002AA842031(10万) ， 2002年到款10万

掺镱光纤放大器
负责人：徐雷, 起止年月：2002.1-2005.12
拨款来源：863总装备部2002AA842012(10万) ， 2002年到款10万

新一代全宽带光网中的关键器件及其应用的基础研究（重大）
负责人：陈良尧(首席专家), 起止年月：2002.1-2004.12
拨款来源：国家科技部20021CCA04600(110万) ， 2002年到款8+8万

快速信息获取和传输中的关键技术基础研究
负责人：陈良尧, 起止年月：2002.1-2005.12
拨款来源：市科委02DJ14001(500万) ， 2002年到款174+45万

表面吸附团簇的结构及扩散动力学理论研究
负责人：庄军, 起止年月：2002.1-2003.12
拨款来源：上海市启明星计划02QA14007(10万) ， 2002年到款9万

新型超薄金刚石X光器件研究（重点用户课题）
负责人：应萱同, 起止年月：2002.1-2004.12
拨款来源：中科院高能所同步辐射装置(BSRF) (1.5万) ， 2002年到款0.5万

100TW超短超强脉冲激光器装置的总体技术方案
负责人：钱列加, 起止年月：2002.1-2002.12
拨款来源：中国工程物理研究院（合作项目）(10万) ， 2002年到款？ 万

有序组装分子超薄的光电特性及其在红外探测器中的应用研究
负责人：马世红, 起止年月：2002.1-2004.6，　　2001年已到款5万
拨款来源：上海市教委 曙光计划(10 万)

实用化视网膜高分辨诊断装置研制及临床应用研究
负责人：范滇元, 起止年月：2002.6-2004.12
拨款来源：上海市科委光科技专项 012261013 (50 万)

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3. Fuxi Gan
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4. Fuxi Gan
   "From optical glass to photonic glasses" (invited)
   The Int.symposium on Photonic Glass Shanghai, China Oct.14-17,2002

5. H. Ling, J.D. Wu, W. Shi, J. Sun, W.J. Pan, Z.F Ying, N. Xu, and F.M. Li,
   "Preparation of carbon nitride thin films containing high nitrogen concentration"
   3rd Forum on New Materials, CIMTEC 2002 (Florence, 2002) (poster)

6. Xuantong Ying, Jinlong Luo, Peinan Wan, Mingqi Cui, Yidong Zhao,
   Gang Li, Peiping Zhu,
   "Ultra-thin freestanding diamond window for soft X-ray Optics"
   presented at 13th European Conference on Diamond and Related
   Materials", Granada, Spain, Sept. 8-13, 2002. (Poster)

7. Y.X.Zheng, X.H.Ju
   "A merit of dielectric layer SiN replaced by semiconducfor layer gap in
   conveafioual dowble layered MO disk" (poster)
   Magneto-Optical Recording International symosium, Benodet,Brittany,
   France, May5-8,2002

8. Y.G.Xi, Lejun Qi, Liying Liu
   "Second harmonic generation and Raman study of second-order
   nonlinearity in PbO/ B_2O_3 glass" (oral)
   The 4th Inter. Conf. On Borate Glasses Crystals,and Melts New
   Techniques and Practical Applications July14-18,2002, USA

9. P.N.Wang, J.Y.Chen
   "Effects of ALA-PDT on leukemia cells and hepatoma cells" (poster)
   1st Asian Conference on PhotobiologyJune, Hyogo, Japan
   Jun.26-28,2002

10. Gan Fuxi, Zhou Qinling, Liu Liying
"New optical phenomena in glass interacted with femtosecond laser" (invited)
7th International Otto Schott Colloquium July7-11,2002, Jena,Germany

11. Peizhen Deng, Yanli Mao, Fuxi Gan
"Laser spectroscopy and performances of Yb^{3+} doped phosphate glass" (invited)
7th International Otto Schott Colloquium July7-11,2002, Jena,Germany

12. 刘言军, 张斌, 徐克璹
"纳米粒度液晶全息特性研究" (分组报告)
第十届全国基础光学与光物理学术讨论会，西安, 2002.10

13. 张斌, 刘言军
"全息聚合物分散液晶器件研制" (分组报告)
中国平板显示学术会议, 深圳, 2002.12

14. 李毅刚，刘丽英，侯占佳，徐雷，王文澄,
"掺铒凝胶玻璃的荧光特性研究", (分组报告)
中国光学学会2002年年会，长春，2002.9

15. 叶明新，侯占佳，刘丽英，徐雷，王文澄，
"新型有机/无机复合材料及其应用研究"，(分组报告)
中国光学学会2002年年会，长春，2002.9

16. 周 鹏 游海洋 王松有 李合印 杨月梅 陈良尧
"金属型一维光子晶体中光的传输特性" (分组报告)
第十一届全国凝聚态光学性质学术会议论文集p42. 2002年8月，云南丽江

17. 王松有 周鹏 郑玉祥 张荣君 李晶 陈良尧
"Cr－Ag颗粒膜的光学尺寸效应研究" (分组报告)
第十一届全国凝聚态光学性质学术会议论文集P32. 2002年8月，云南丽江

18. 贾建虎，游海洋，倪卫明，韩涛，周鹏，王松有，李晶，张荣君，郑玉祥，
陈剑科，杨月梅，陈良尧
"多光栅波长扫描的小型化全自动椭圆偏振光谱系统研究" (分组报告)
第十一届全国凝聚态光学性质学术会议论文集P106. 2002年8月，云南丽江

19. 游海洋，倪卫明，贾建虎，韩涛，周鹏，李晶，王松有，张荣君，郑玉祥，陈剑科，杨月梅，陈良尧
“面阵CCD探测的全自动椭圆偏振光谱系统研究”(分组报告)
第十一届全国凝聚态光学性质学术会议论文集P106,2002年8月，云南丽江

20. 张晋敏　杨　宇　陈良尧.
“溅射气压对SiGe/Si超晶格的光学常数的影响”(分组报告)
第十一届全国凝聚态光学性质学术会议论文集，P31. 2002年8月，云南丽江

21. 郜小勇 张晋敏 凌浩 吴嘉达 杨月梅 陈良尧
“退火对CN_x薄膜光学性质的影响”(分组报告)
第十一届全国凝聚态光学性质学术会议论文集，P71, 2002年8月，云南丽江

22. 郑玉祥，巨晓华，张荣君，王松有，李晶，陈良尧
“超高密度3维磁光光盘的光学与热设计”(分组报告)
第十一届全国凝聚态光学性质学术会议论文集P15　2002年8月，云南丽江

23. 李莉，张荣君，邬云骅，巨晓华，李晶，王松有，郑玉祥，陈良尧，孙朝奇
“AgF_2金属陶瓷复合薄膜的光学性质实验研究”(分组报告)
第十一届全国凝聚态光学性质学术会议论文集，P15 2002年8月，云南丽江

24. 谌达宇，张荣君，朱伟丹，陈宝辰，王松有，李申初，陈良尧
“光通信DWDM系统的100GHz窄带滤波片设计和研制”(分组报告)
第十一届全国凝聚态光学性质学术会议论文集P118, 2002年8月，云南丽江

25. 张荣君，谌达宇，李莉，邬云骅，周鹏，陈良尧
“光学滤光片薄膜镀制工艺中的监控技术模拟分析”(分组报告)
第十一届全国凝聚态光学性质学术会议论文集，P112,2002年8月，云南丽江

26. Tao Han, Wei-Ming Ni, Peng Zhou, Hai-Yang You, Jian-Hu Jia, Song-You Wang and Liang-Yao Chen
“New design of the monochromatic system using multiple gratings and a two-dimensional CCD array detector” (分组报告)
第十一届全国凝聚态光学性质学术会议论文集P105, 2002年8月，云南丽江

人员名单
Faculty Members

在研人员：Faculty members in 2002

陈良尧　教授，博士，凝聚态光学
CHEN Liangyao, Prof., Ph.D., Optical properties in condensed matter

范滇元，教授，中科院院士，高功率激光技术、激光与物质相互作用
FAN Dianyuan, Prof., Academician: Highpower laser physics, Laser-material interactions

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GAN Fuxi, Prof., Academician, Optics and condensed matter physics

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HOU Zhanjia, Associate Prof., Ph.D., Optical waveguide, nonlinear optics

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JIN Qingyuan, Prof., Ph.D., Magnetism and optical response from ultrathin multilayers

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LI Jing, Associate Prof., Ph.D., Optical properties in condensed matter

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LIU Jianhua, Associate Prof., Ph.D., Ultra-short optical pulse, Ultra-fast phenomena

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LIU Liying, Prof., Ph.D., Optical nonlinear LB films and waveguide

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LU Ming , Associate Prof., Ph.D.,　Material physics

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QIAN Liejia, Prof., Ph.D., Laser physics

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SUN Jian, Lecturer, Ph.D., Laser physics

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WANG Gongming, Prof., Optical nonlinear LB films and waveguides

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WANG Guoyi, Associate Prof., Laser Spectroscopy

王培南　教授，博士，激光光谱、激光烧蚀过程的动力学
WANG Peinan, Prof, Ph.D., Laser spectroscopy, Laser ablation dynamics

王松有　副教授，博士，凝聚态光学
WANG Songyou,Associate Prof., Ph.D., Optical properties in condensed matter

王　韬　讲师，博士，激光物理
WANG Tao, Lecturer, Ph.D., Laser physics

王文澄　教授，光学非线性LB膜及光波导
WANG Wencheng, Prof., Optical nonlinear LB films and waveguides

吴嘉达　教授，博士，激光物理，等离子体物理
WU Jiada, Prof., Ph.D., Laser physics, plasma physics

徐克璹　教授，信息光学和铁电液晶器件
XU Keshu, Prof., Optical information processing, Ferroelectric liquid crystal display device

徐　雷　教授，博士，玻璃波导及线性和非线性光学性质
XU Lei, Prof., Ph.D., Silica waveguide and its linear & nonlinear properties

夏绍丰　教授，电子学
XIA Shaofeng, Prof., Electronics

许　宁　副教授，博士，氮原子束辅助激光烧蚀合成氮化物薄膜
XU Ning, Associate Prof., Ph.D., Nitrogen-based thin film deposition via laser ablation with atomic nitrogen ion beam

叶衍铭　高级实验师，激光医学
YE Yanming, Senior engineer, Laser application in medicine

应萱同　教授，博士，金刚石薄膜的研制、测试与分析
YING Xuantong, Prof., Ph.D., Fabrication and analysis of diamond thin films

应质峰　副教授，硕士，激光溅射成膜研究
YING ZhiFeng, Associate Prof., Films deposition by laser ablation

张荣君　副教授，博士，凝聚态光学
ZHANG Rongjun, Associate Prof., Ph.D., Optical properties in condensed matter

郑玉祥　副教授，博士，凝聚态光学
ZHENG Yuxiang, Associate Prof., Ph.D., Optical properties in condensed matter

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ZHU Heyuan, Associate Prof., Ph.D., Ultra-short optical pulse, Ultra-fast phenomena

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ZHUANG Jun, Associate Prof., Ph.D., (theoretical) Atomic and molecular physics

戴祝萍　工程师　　DAI Zhuping, Engineer

胡谊梅　工程师　　HU Yimei, Engineer

钱红声　实验师　　QIAN Hongsheng, Engineer

吴善亮　实验师　　WU Shanliang, Engineer

徐新民　技师　　XU Xinmin, Technician

张敏毅　工程师　　ZHANG Minyi, Engineer

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返聘人员：

陈凌冰 教授，激光物理和激光光谱，重点在室温微粒烧孔
CHEN Linbin, Prof., Laser physics and laser spectroscopy, especially in spectral hole burning based on morphology-dependent resonance in micro-particles

李郁芬 教授，团簇物理、激光光谱
LI Yufen, Prof., Cluster physics, Laser spectroscopy

伍长征 教授，激光物理、激光材料改性
WU Changzheng, Prof., Laser physics, Laser assisted material modification

赵有源　教授，高分辨率激光光谱与固体光谱烧孔研究
ZHAO YouYuan, Prof., Laser spectroscopy and spectral hole burning in solids

郑家骠 教授，表面、界面的非线性光学性质
ZHENG Jiabiao, Prof., Optical nonlinear properties of surfaces and interfaces

李富铭　教授，激光物理、激光光谱和超快光学
LI Fuming, Prof., Laser physics, Laser spectroscopy, Ultra-fast optics

邢中菁　实验师　　XING Zhongjing, Engineer

博士后:　**Postdoctoral fellows**

贾宏志(JIA Hongzhi), 秦宗益(QIN Zongyi), 葛爱明(GE Aiming)
吕卫(LU Wei), 文双春(WEN Shuangchun)

博士生: **Ph.D. candidates**

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01级　郜小勇(GAO Xiaoyong), 陈光辉(CHEN Guanghui), 凌浩(LING Hao),
骆金龙(LUO Jinlong), 张小民(ZHANG Xiaomin),
郑卫国(ZHENG Weiguo), 隋展(SUI Zhan)

02级　李毅刚(LI Yigang), 刘秀(LIU Xiu), 韩涛(HAN Tao),
缪健(MIAO Jian), 周鹏(ZHOU Peng), 傅喜泉(FU Xiquan),
沈宏(SHEN Hong),　苏文华(SU Wenhua), 戴海涛(DAI Haitao)

硕士生: **M.S. students**

00级　王 昕 (WANG Xin), 刘 言 军 (LIU Yanjun), 高 春 雷 (GAO Chunlei),
赵元(ZHAO Yuan), 沈宏(SHEN Hong), 徐炯(XU Jiong),
凌涛(LING Tao), 李淑红(LI Shuhong), 王贤江(WANG Xianjiang),
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许旭东(XU Xudong), 周鹏(ZHOU Peng)

01级　邬云华(WU Yunhua), 贾亚杰(JIA Yajie), 刘庆炜(LIU Qingwei),
崔付明(CUI Fuming), 李潞瑛(LI Luying), 陈昊(CHEN Hao),
游海洋(YOU Haiyang), 贾建虎(JIA Jianhu), 潘伟剑(PAN Weijian),
王雷(WANG Lei), 李莉(LI Li), 叶骏(YE Jun), 谢航(XIE Hang)

02级　谢国强(XIE Guoqiang), 李丽(LI Li), 李维卿(LI Weiqing),
何子安(HE Zian), 邱恒山(QIU Hengshan), 邵和助(SHAO Hezhu),
武爱民(WU Aimin), 叶小炜(YE Xiaowei), 刘俊峰(LIU Junfeng),
李冬晓(LI Dongxiao), 糜岚(MI Lan), 漆乐俊 (QI Lejun),

孙志华(SUN Zhihua), 邱建红(QIU Jianhong), 沈小康(SHEN Xiaokang), 宋清海(SONG Qinghai)

本系访问学者和部分参观人员
Guest Scientists & Some Visitors

部分来室访问及作报告的学者

2002.1.8　　863专家组—光电子组组长陈皓明，来室访问。

2002.4.23　Chung-Hsuan Chen, Oak Ridge National Lab， USA
报告：“Laser and mass spectrometry for material analysis from single atom detecyion to DNA sequencing”

2002.5.9　Katsuhisa Tanaka(田中胜久)Kyoto institute of technology， Japan
报告：“SHG in poled oxide glasses and nanostructured thin films”

2002.5.28　沈元壤(Y.R.Shen) 加州大学伯克利分校教授, 美国科学院院士，来室指导工作

2002.6.25　邱建荣博士,中日Photo-Craft项目组长,中科院上海光机所研究员
报告：“全光诱导光功能微结构”

2002.6.28　郑建平教授, Florida State University Dept.E E， USA
报告：“多孔硅的发光机制”

2002.7.3　萧敏教授,Arkansas University Dept. USA
报告：“量子点的光学性质”

2002.7.30　Prof.Richard K.Chang, Henryford II Professor of Applied Physics Professor of Electrical Engineering and Physics Yale University,USA
报告：1.“Microcavities for lasers and filters”
2.“light scattering of micro-particles”

2002.9.3　李成博士，英国南安普敦大学光电所
报告：“高功率光纤激光器与平面波导激光器”

2002.9.18-19　Jeffery 博士，美国康乃尔大学物理系，来室访问并和有关人员讨论工作。

2002.10.15　Tatsu Okada 教授，日本九州大学电气与电子系统工程系
报告：“Synthesis of optically function thin films and nanostructure by laser ablation: from basic to application”

2002.10.16　沈元壤(Y.R.Shen) 加州大学伯克利分校教授, 美国科学院院士
来室指导工作

2002.10.16　Dr.Andre Girard, Senior Member of Technical Staff, EXFO, USA
报告：“Optical measurement method for passive components in optical communication and the trend for optical communication”

2002.10.18　刘慧民博士,波多黎各大学物理系教授(NASA主要研究人员) USA
报告：“Transient valence state switching of Eu in Si/SiO2 nanocomposites”

2002.11.1　863-804主题专家组组长、中国工程物理研究院副院长张维岩研究员，协同主题办公室主任方勤学研究员来室访问。

2002.11.19　肖旭东教授，香港科技大学物理系香港
报告：“Photoluminescence of carbon”

2002.12.27　Yun Luo(罗韵) 德国 Max-Planck Institute for Microstructure Physics
报告：“Photonic Bandgap Materials:A semiconductor for light”

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