

ABSTRACTS OF PUBLISHED PAPERS

(Accepted November , 1998)

CONDENSED MATTER AND MATERIAL

Symmetry of, and Polarized-Laser-Induced Reactions on, Si(111)/Cl₂ Surfaces Studied by Second-Harmonic Generation

Satoshi HARAICHI, Fumio SASAKI

J.Vac.Sci.&Technol.A **16** 5 (1998) 3029-3033

The surface symmetry of, and the polarized-laser-induced reactions on, Si (111)/Cl₂ surfaces have been studied using second-harmonic generation (SHG). The outermost surface originated SHG signals, generated by 1.1, 1.3 and 2.0eV probe, show the modified 3m symmetries enhanced along the $[2\bar{1}\bar{1}]$ direction, probably because of a macroscopic asymmetric surface structure along the $[2\bar{1}\bar{1}]$ orientation. On the other hand, the SHG signals originated by the direct bulk transition, generated by 1.6 and 1.7eV probe, show good 3m symmetries rather reflecting the symmetry of bulk Si. The threshold power densities of the laser-induced Si (111)/Cl reaction showed significant dependence on the pump polarization with respect to the crystal orientation of the sample surface, and no important dependence on that with respect to the plane of incidence.

Exact-Diagonalization Study on the Effect of the Long-Range Coulomb Interaction to the Superconducting Ground State in the Two-Chain Hubbard Model

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Physica C **308** 3-4 (1998) 301

We present exact-diagonalization results clearly indicating that the long-range part of Coulomb interaction does not sweep away the superconducting region of the two-chain Hubbard model driven by the short-range part. When the model contains

the nearest-neighbor Coulomb interaction both for the interchain and the intrachain directions, the region of developed superconducting correlations in the ground state is reduced. The CDW correlation is found to increase, intervening with the competition between superconductivity and CDW. When we include the long-range Coulomb interaction of the type of $1/r$, the instability to the CDW state weakens with the superconducting region recovered to some extent compared with the above case.

ELECTRONIC DEVICES

Suppressed Threshold Voltage Roll-Off Characteristic of 40nm Gate Length Ultrathin SOI MOSFET

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ELECTRONICS LETTERS **34** 21 (1998) 2069-2070

We have experimentally demonstrated a highly suppressed threshold voltage roll-off characteristic of a 40nm gate length ultrathin (11nm) silicon-on-insulator *n*-MOSFET. It is observed that ΔV_{th} is only 0.2V when compared with a long gate length (150nm) device. The marked effectiveness of an ultrathin SOI channel is experimentally confirmed to suppress the short-channel effect.

Characteristics of Cavity Round-Trip Time Pulses in Short-Cavity Q-Switched AlGaAs Multiple-Quantum-Well Semiconductor Lasers

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Jpn. J. Appl. Phys. **37** Part 2 9A/B (1998) L1040-L1042

In the AlGaAs/GaAs two-section multiple-quantum-well (MQW) laser system, Q-switched optical pulses whose width is shorter than the cavity round-trip time were obtained by driving the gain section with 200 ps electrical pulses. The pulse-width characteristics were measured while varying the cavity length, and the optimum cavity length for obtaining the shortest optical pulses was found. When the cavity length was 170-200 microns, the shortest optical pulses with a width of 6-8 ps was obtained. We also found a profile change in the second-harmonic-generation (SHG) auto-correlation trace when the cavity length was changed.

Wet Chemical Etching of GaN Using Hot Pyrophosphoric Acid

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Proceedings of the 2nd International Symposium on Blue Laser and Light Emitting Diodes (1998) 723-726

In this paper we report on the wet chemical etching method for GaN epilayers using a hot pyrophosphoric acid. In this method, neither anodizing of the GaN films using metal masks nor ultra-violet light illumination, is required for enhancement of the etching rate, and we achieved the etching rate of about 100 nm/min. By this etching process, we performed the patterning of the GaN epilayers using silicon dioxide films as the etching masks. Also we found threshold characteristics in temperature dependence of the etching rate. Only when the etching temperature is higher than the threshold temperature of 210-220 degrees, we found significant etching effect.

INFORMATION SCIENCE

MIKE: An Automatic Commentary System for Soccer -- System Design and Topic Control--

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Proceedings of ICMAS'98 285

This paper describes Mike, an automatic commentary

system for the game of Soccer. Since Soccer is played by teams, describing the course of a game calls for reasoning about multi-agent interactions. Also, events may occur at any point of the field at any time, making it difficult to fix viewpoints. Mike understands this domain by using a role-sharing structure to mediate between six concurrently running soccer analysis modules including two that carry out high-level analysis. We describe these analysis modules and also discuss how to control the interaction between them so that an explanation of a game emerges reactively from the system. We present and evaluate examples of the match commentaries produced by Mike in English, Japanese and French.

The Stability of the Solution in Fully Connected Neural Networks with the Encouragement Factor

Tohru NITTA

Proc. the Fifth International Conference on Neural Information Processing 1 (1998) 518-521

This paper presents a mathematical analysis of the encouragement factor in the energy function of fully connected neural networks for solving the Traveling Salesman Problem (TSP). When solving the TSP on fully connected neural networks, the balance between the operation preferring a short path and one preferring to visit each city only once is very important, which indeed influences the results of solving the TSP. In order to control this balance, Akiyama et al. introduced a new parameter called the encouragement factor to the energy function. This paper will give the theoretical foundation of the encouragement factor for a more general model than that of Akiyama et al.

Automatic Extraction of Motifs Represented in the Hidden Markov Model from a Number of DNA Sequences

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Bioinformatics 14 4 (1998) 317-325

We propose a new method for automatic extraction of motifs that occur frequently on a set of unaligned DNA sequences. The method was applied to human promoter sequences and some of the important motifs have been extracted.

A Factorization Method for Multiple Perspective Views via Iterative Depth Estimation

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The transactions of IEICE J81-D-II 8 (1998) 1718-1726

A factorization-based method for shape and motion recovery from multiple perspective views is proposed. Depth parameters which make the measurement matrix rank 4 as close as possible are iteratively estimated. Both projective motion and shape are then recovered by factoring the measurement matrix constructed from the obtained depths. Since this strategy avoids computation of fundamental matrices required in conventional methods, the reconstruction is very stable. We also derive metric constraints for perspective cameras and show that Euclidean reconstruction is possible when the intrinsic camera parameters are available. The validity of the proposed method is confirmed by experiments with real images.

BIOSCIENCE

Odorant Perception and Active Olfaction: A Study of Olfactory Magnetic Fields Evoked by Odorant Pulse Stimuli Synchronized with Respiratory Cycle

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*Proceedings of 20th Annual International Conference
IEEE/EMBS* 20 4 (1998) 2213-2216

This paper presents a study on the odorant perception and active olfaction for human olfactory senses and their active locations of estimated signal sources in the brain. In this

experiments olfactory event-related potentials were measured by electroencephalography (EEG) and olfactory event-related magnetic fields were also measured by magnetoencephalography (MEG) using a 122ch whole-head neuromagnetometer. Odorant stimuli were actively given into the right or left nose cavity through a thin silicon tube using a mask attached on the subject's face by a odorant pulses synchronized with the subject's respiratory cycle. MEG main response waves were sharply detected and these signal sources were estimated to exist as two dipoles bilaterally at the orbito-frontal lobe in the brain. In our second experiments olfactory event-related magnetic fields were measured by an oddball paradigm using two odorants and these estimated signal sources were obtained at a few superior temporal regions. These active responses for odorants show us the capabilities of the role on the olfactory perception and active olfaction.

OPTICS AND RADIATION

Ti/Al Multilayer Zone Plate and Bragg-Fresnel Lens

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J.Synchrotron Radiation 5 (1998) 794-796

By using a helicon plasma sputtering technique, a one-dimensional Ti/Al multilayer zone plate with an outermost layer width of 76 nm has been successfully fabricated. A Bragg-Fresnel lens has been made by combining this zone plate with a Ge(422) crystal. Comparison of the Ti/Al multilayer zone plate with the Ag/Al zone plate is discussed in terms of focusing efficiency.

Chirped-Comb Generation in Frequency-Shifted Feedback Laser Diodes with a Large Frequency Shift

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Optics Communications 155 (1998) 51-54

Chirped-comb generation has been observed in an external-cavity laser diode with a grazing-incidence grating

and an intracavity acousto-optic frequency shifter. In contrast to the previous works in which the ratio of the intracavity frequency shift to the cavity free spectral range is much smaller than unity, our experiment was performed for a wide range of the ratio from 0.21 to 1.4.

Correlation between Amplitude and Phase Noise in a Mode-Locked Cr:LiSAF Laser

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Optics Letters **23** 21 (1998) 1686-1688

The coherence function between the amplitude and phase fluctuations of a mode-locked Cr:LiSAF laser has been measured with a time-domain demodulation technique. A relatively large correlation has been found for the noise components that originate in the pump-power fluctuation. Through an examination of the modulation-induced change in the noise power spectral densities, the influences of pump-power and cavity-length variations on these fluctuations have been investigated.

ENERGY TECHNOLOGY

Thermoelectric Properties of P-Type Bi-Sb-Te Based Materials Prepared by PIES Method with Conventional Ball Milling Process

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Proc. 16th International Conference on Thermoelectrics

(1998) 85-88

For the development of energy saving processes for producing thermoelectric materials, the PIES (Pulverized and Intermixed Element Sintering) method is known as a suitable one. In this study, a high figure of merit p-type Bi-Sb-Te based thermoelectric material was obtained by the oxygen free PIES method. The electrical resistivity of p-type $(\text{Bi}_2\text{Te}_3)_{0.175}(\text{Sb}_2\text{Te}_3)_{0.825}$ material was reduced to 0.8×10^{-5} ohm·m without decreasing seebeck coefficient by fabrication in the oxygen free atmosphere process. The maximum ZT value was almost 1.0. Moreover, it was demonstrated that the improvement in figure

of merit value is obtained even if the intermixed powder of elements was prepared by a conventional ball milling process in stead of the high energy ball milling process. The PIES method using a low energy ball milling process is suitable for mass-production because of its cost efficiency.

OTHERS

Estimation of Spectral Reflectance Distributions of Highly Saturated Colors in Munsell Color Order System

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J. Illum. Engng. Inst. Jpn. **82** 11 (1998) 902-916

In the previous study(Sobagaki et al. 1983), we applied principal component analysis to the measured spectral reflectance distributions (SRDs) of the JIS Z8721 color chips, and proposed a reconstituted method for deriving the SRD corresponding to any specified Munsell notation. However, the SRD generated by the method did not satisfy the object color condition for highly saturated colors. In this paper, we derive the SRD satisfying the object color condition in the region of highly saturated colors. The SRD of highly saturated colors is given by combining the SRD obtained by the reconstituted method with that of optimal colors and with those of achromatic colors. This method was applied to all the highly saturated colors specified in JIS Z8721 to provide the standard colorimetric values under CIE standard illuminant D_{65} .