GaAs (GaAlIn)(AsNSb)

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WWW.MBE-ISCAS.CN

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⅄GaAs (GaInAl)(AsNSb)

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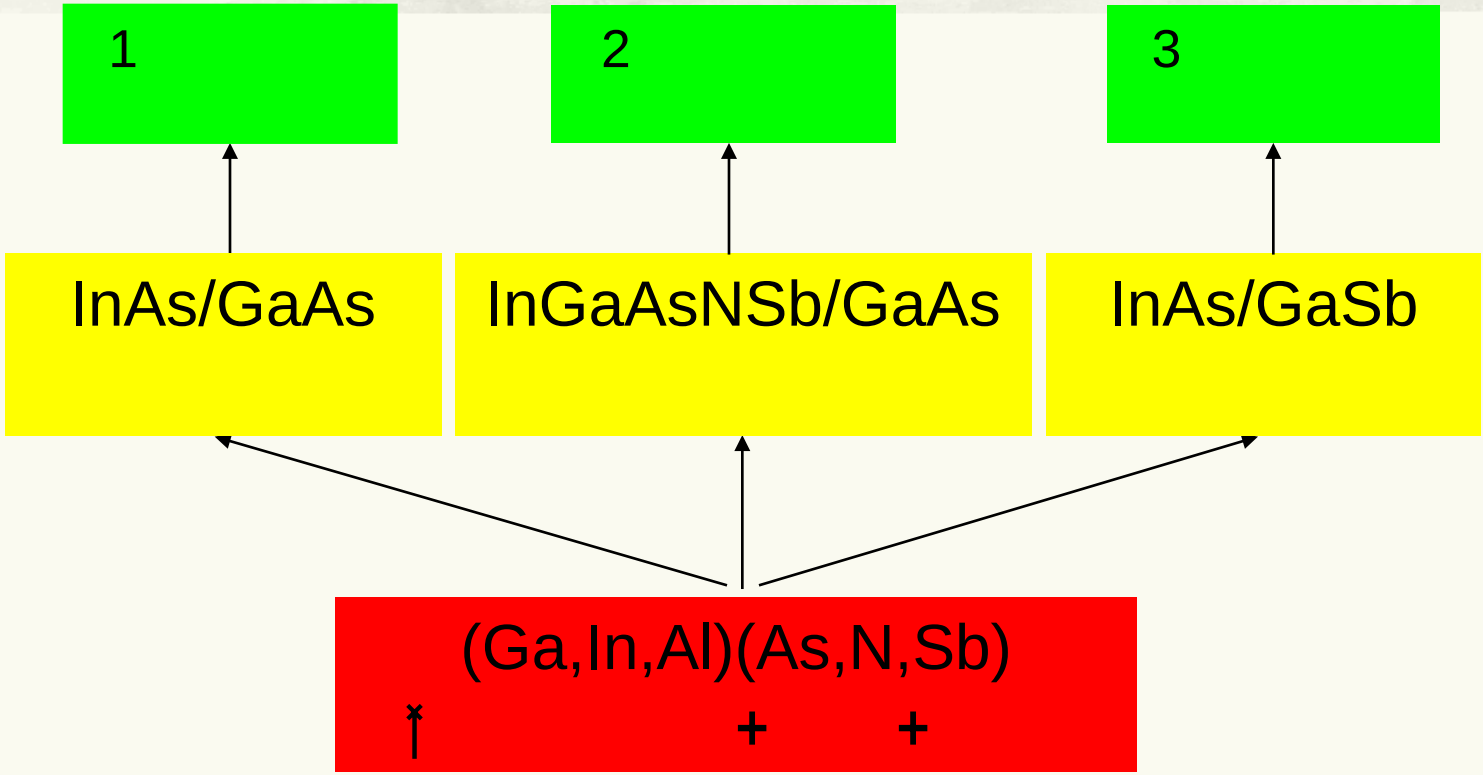

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VEECO Gen II VG V80 MkII MBE

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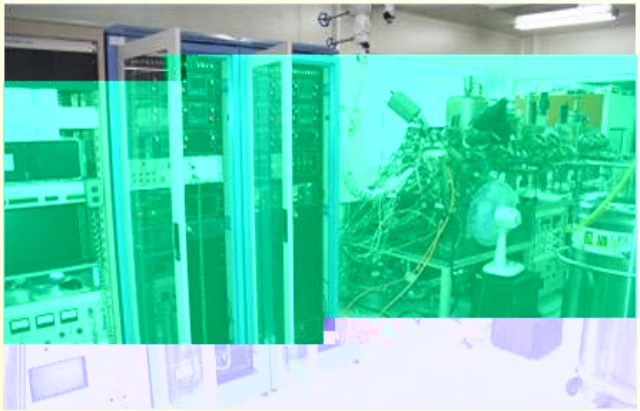

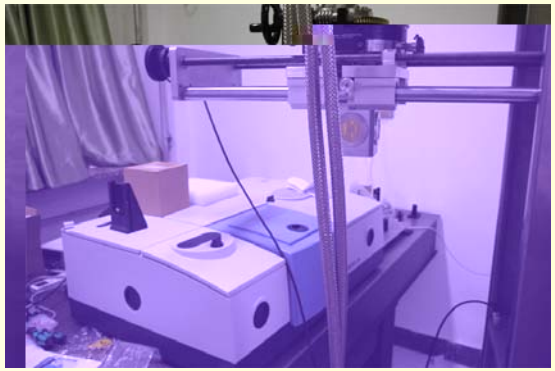

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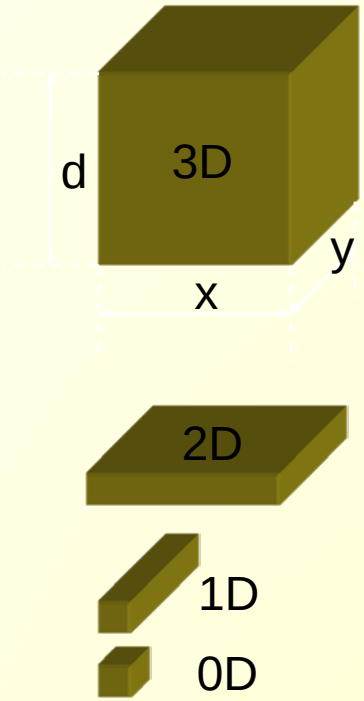
d
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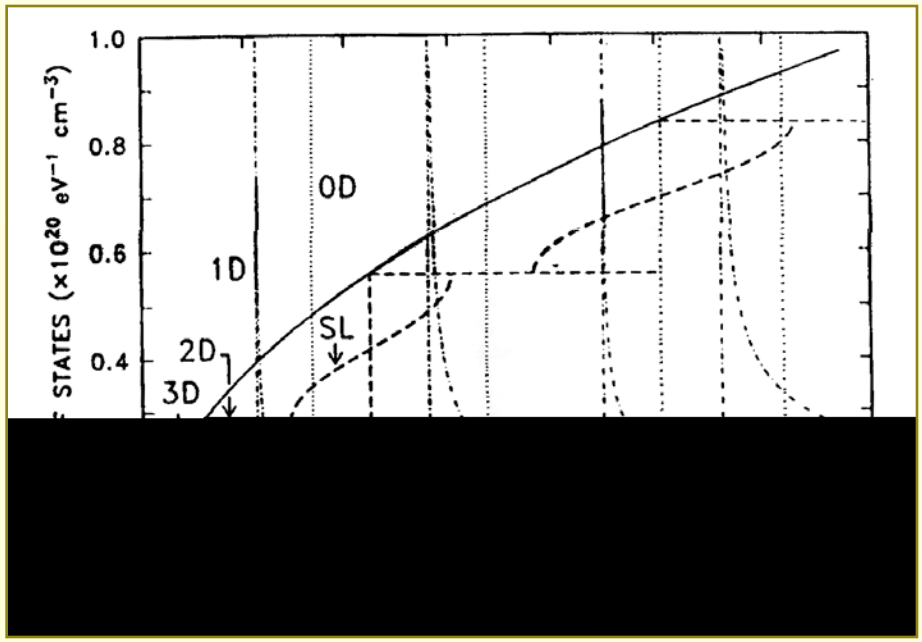
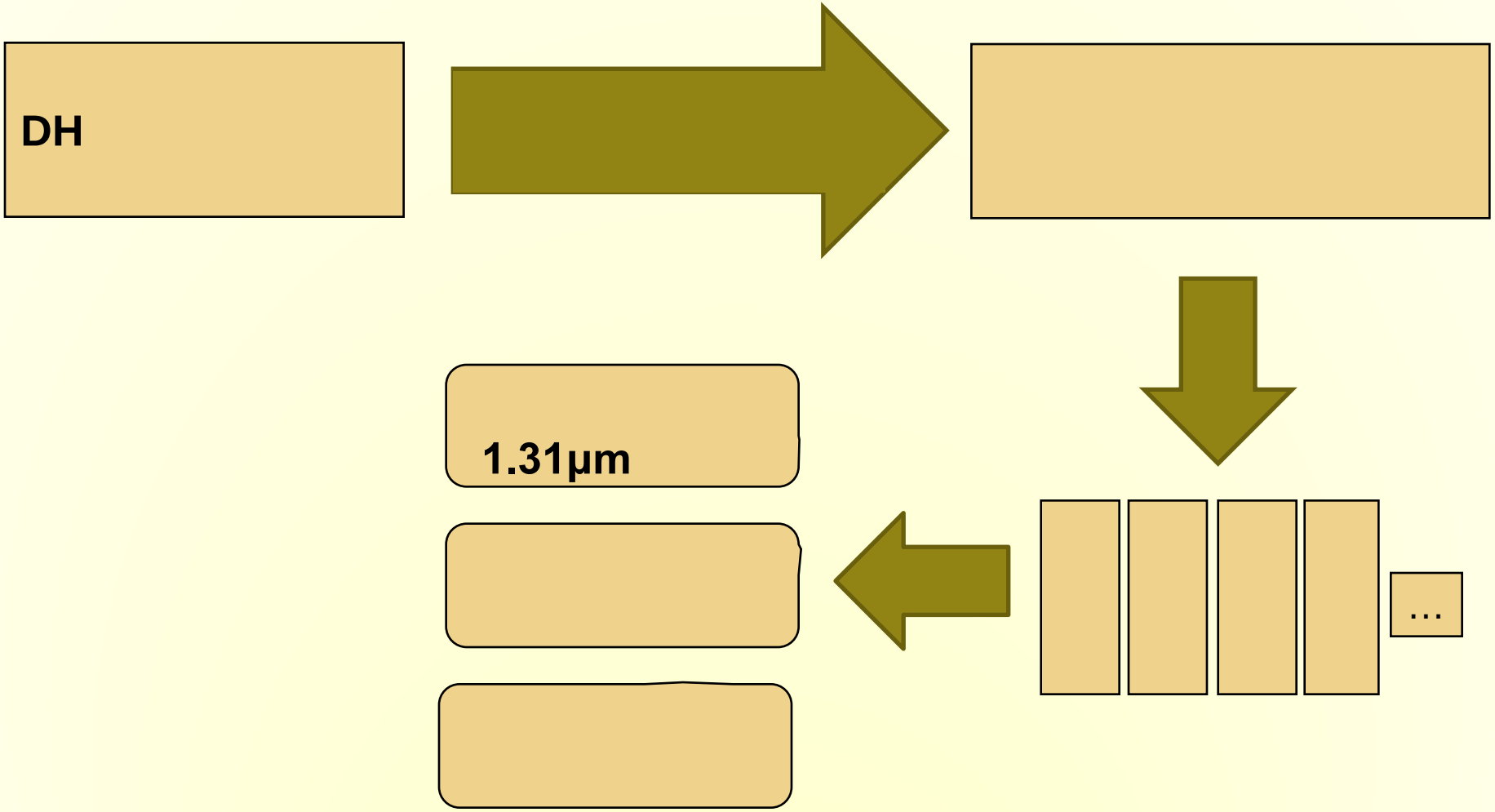

1.0
0.8
0.6
0.4
STATES (×10^20 eV^-1 cm^-3)
0D
1D
SL
2D
3D


DH
1.31μm
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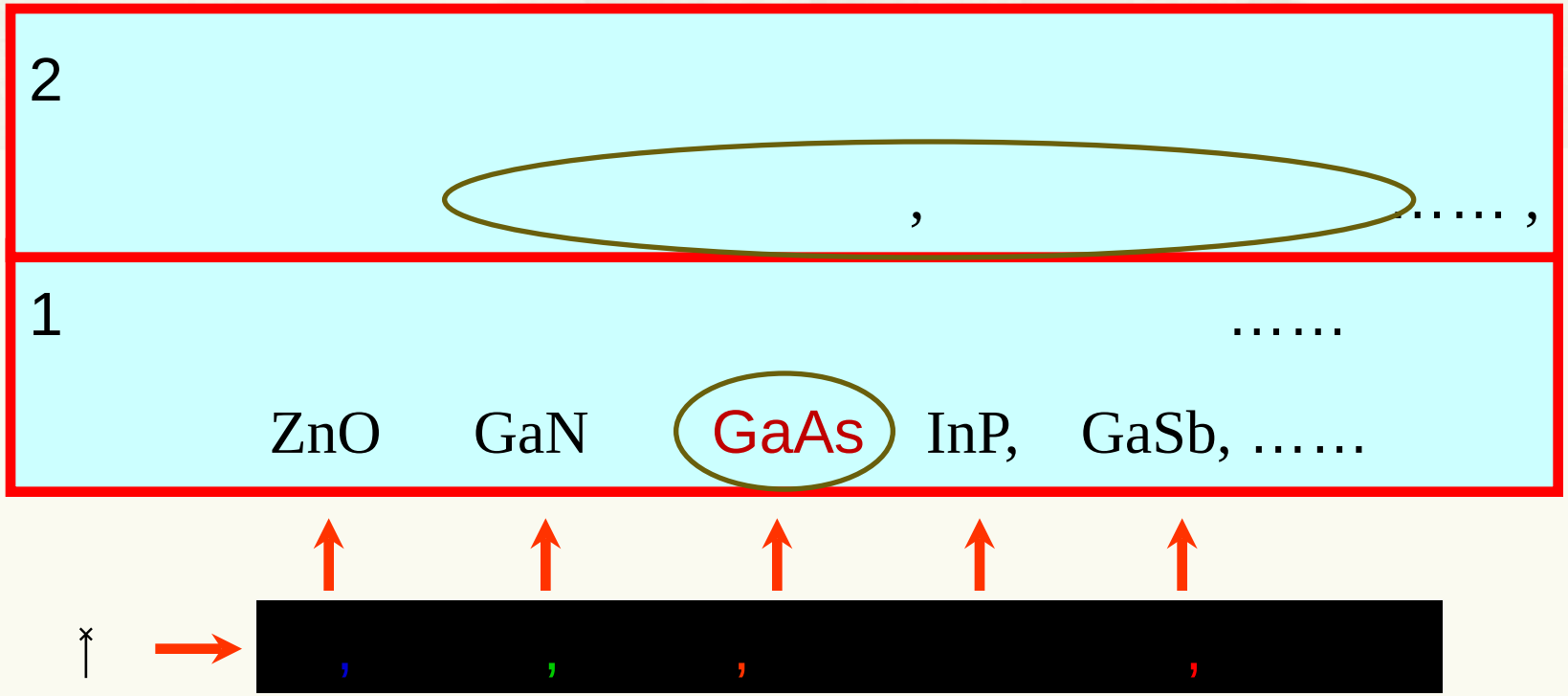
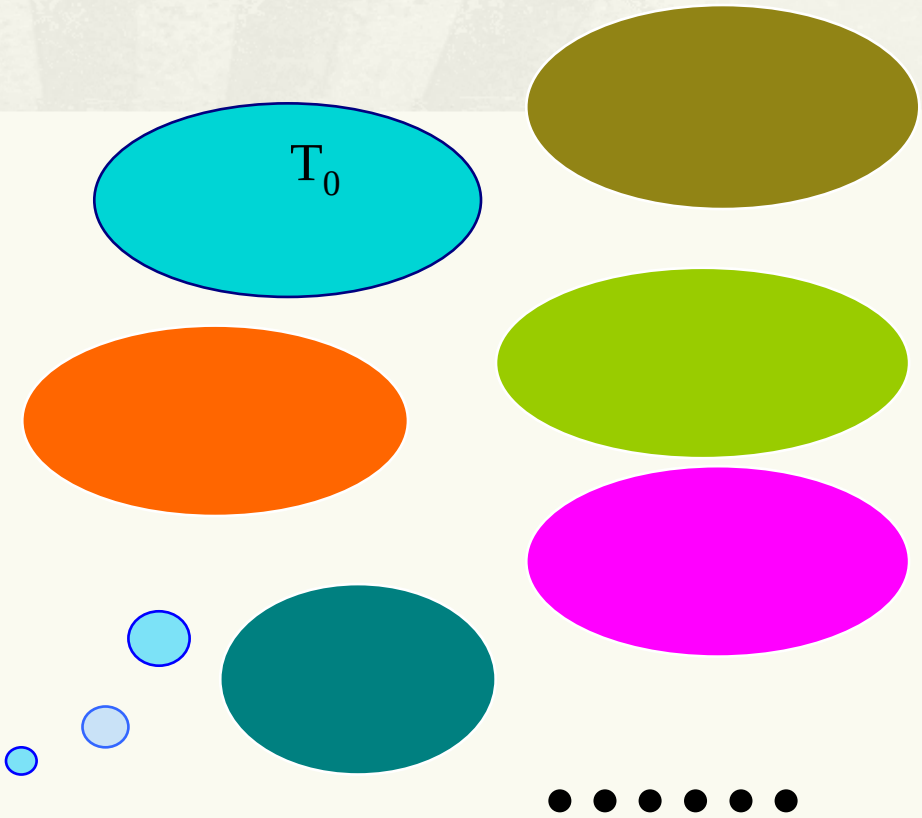
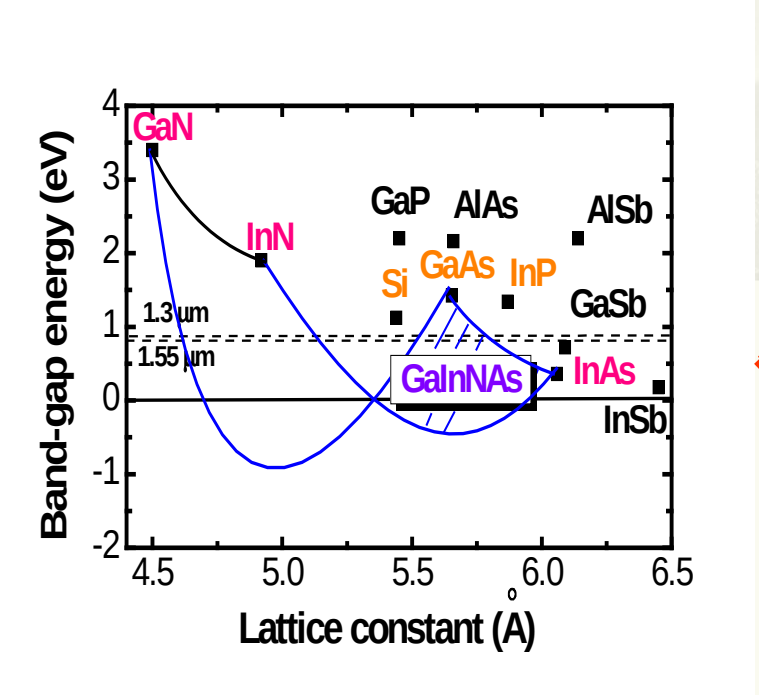

2
, …… ,
1
……
ZnO GaN GaAs InP, GaSb, ……
, , , ,

GaAs

- GaAs
- لا 200 K
- GaAs/AlAs DBR: لا صي
- Si GaAs ،



GaAs ` /



1 AlGaAs InGaAs

2 GaInAsNSb

1 InAs

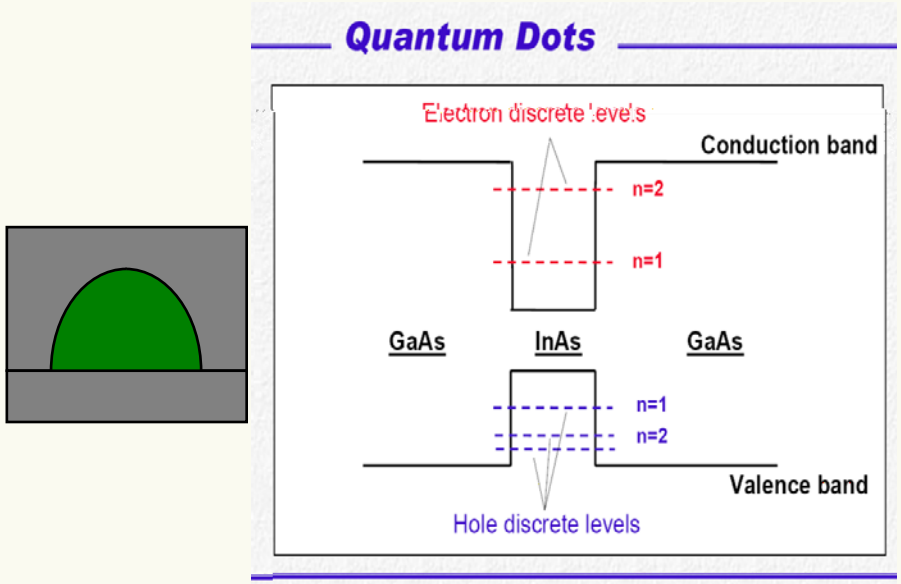
2 InGaAs ↓

3 InAs/GaSb

1 InAs
2 InGaAs(NSb)
3 InAs/GaSb

1 InAs

InAs


Quantum Dots
Electron discrete levels
Conduction band
n=2
n=1
GaAs
InAs
GaAs
n=1
n=2
Valence band
Hole discrete levels

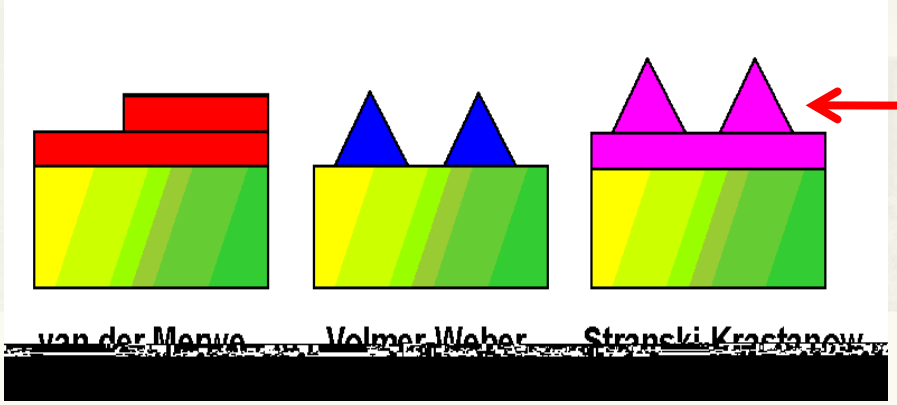
1.3 InAs

1.3-1.5 ㄱ ㄨ InP
ā GaAs

InGaAs Э 1.2
ㄴ ㄱ 1.3-1.5

InAs/GaAs

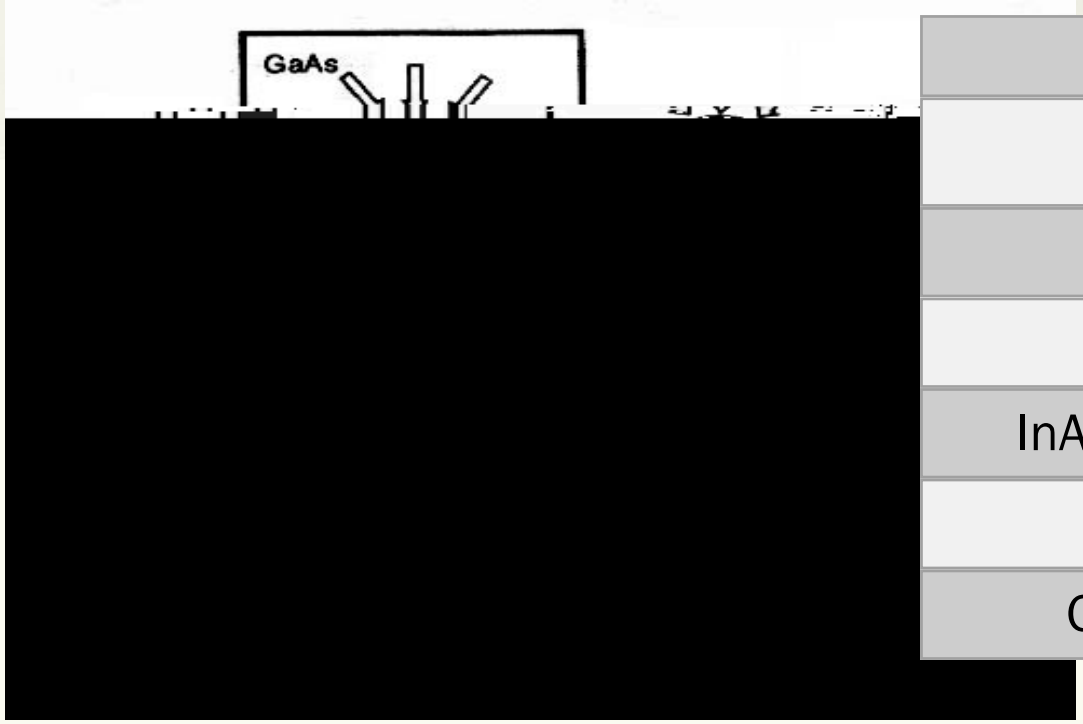
InAs



SK
InAs/GaAs

1 **2** **3**

1.3



GaAs cap
InGaAs cover
InAlAs cover
InAs QDs
GaAs buffer
GaAs (001) substrates

´ ⅄ ⅄ ≡

20nm GaAs cap
3nm $In_{0.2}Ga_{0.8}As$ cover
3ML AlAs cover
InAs QDs
500nm GaAs buffer
GaAs (001) substrates

1 InAs

2 ´ ⅄ InAs/GaAs

3 ´ ⅄ InAs/GaAs

4 InAs/GaAs

1.3 InGaAs PL

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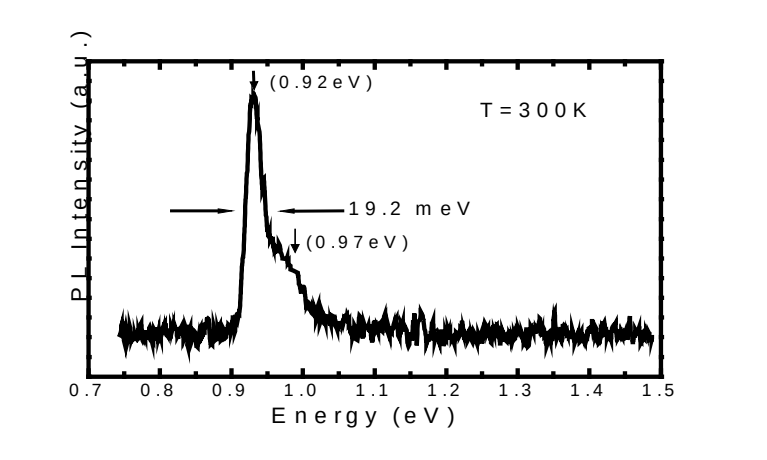

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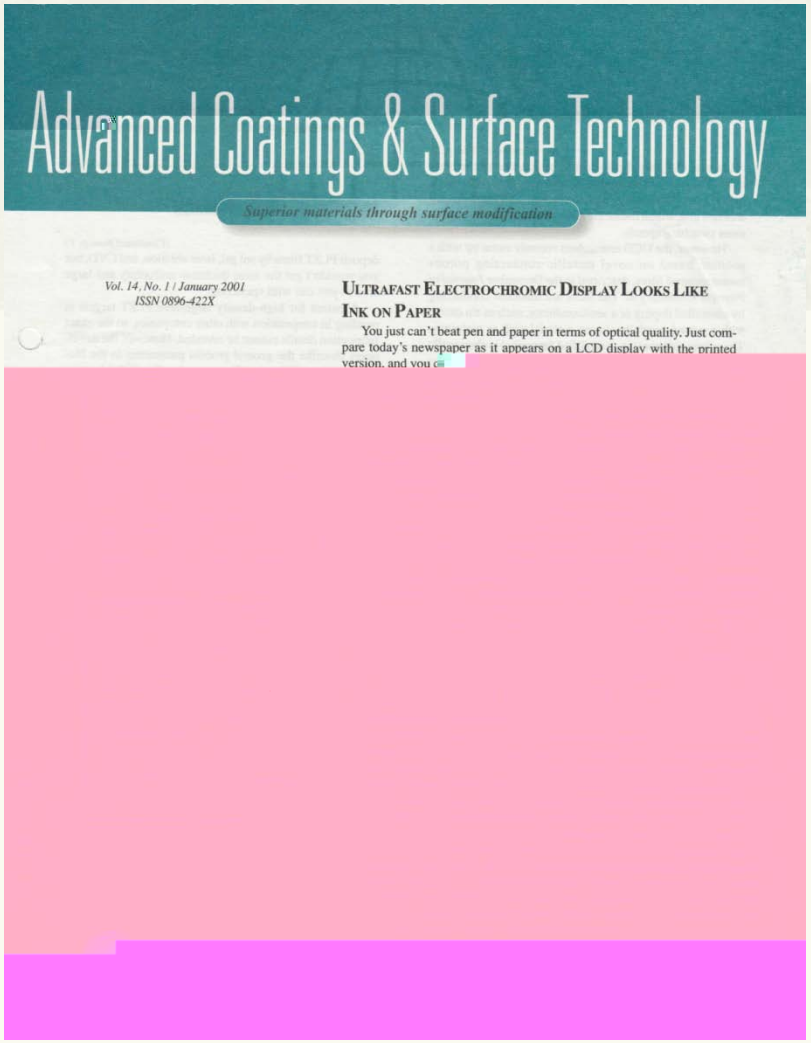
Adv. Coatings & Surf. Technology: Technical Insights



Advanced Coatings & Surface Technology

Superior materials through surface modification

Vol. 14, No. 1 / January 2001
ISSN 0896-422X

ULTRAFAST ELECTROCHROMIC DISPLAY LOOKS LIKE INK ON PAPER

You just can't beat pen and paper in terms of optical quality. Just compare today's newspaper as it appears on a LCD display with the printed version, and you ca

ULTRAFAST ELECTROCHROMIC DISPLAY

(Continued from p. 1)

films was that only the dye could be attached to the electrode. The molecule needed to complete the electrochemical cell, known as the redox mediator, could not be effectively attached to it, which meant the films could not achieve maximum switching speeds.

However, the UCD researchers recently came up with a solution based on novel metallic conducting porous nanostructured films, described in the December *Journal of Physical Chemistry B*. The films are rendered conducting by controlled doping of a semiconductor, such as tin oxide, with a second carefully chosen material such as antimony. The redox mediator (e.g., a modified ferrocene) is chemically attached to this electrode in the same way as the electrochromophore is attached to the semiconducting layer.

As a result, both halves of the electrochemical system are confined to the electrodes. Plus, the conducting film is good at transporting charge out of the device. Since both molecules are low in direct contact with the electr

NanoChrome recently reported switching times as low as 3 ms and the films' color lasts from hours to days

The nanostructured films used in these systems are prepared by draw-down or screen printing techniques using

+353-1-706-7896. E-mail: nanochromics@nanomat.ie. URL: www.nanochrome.com; a-u.ac.jp/okuyamalab.

PLZT SPUTTERING TARGETS

(Continued from p. 1)

deposit PLZT films by sol gel, laser ablation, and CVD, but you wouldn't get the same thickness uniformity and large area as you can with sputtering.

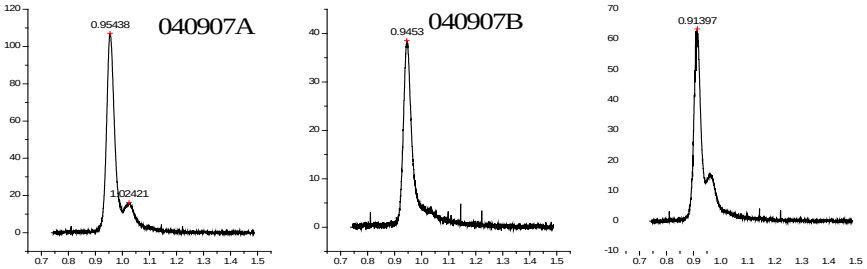
A patent for high-density large-area PLZT targets is pending in cooperation with other companies, so the exact fabrication details cannot be revealed. However, the developers describe the general process parameters in the November issue of *Vacuum*. Team member Kouji Hidaka says that the co

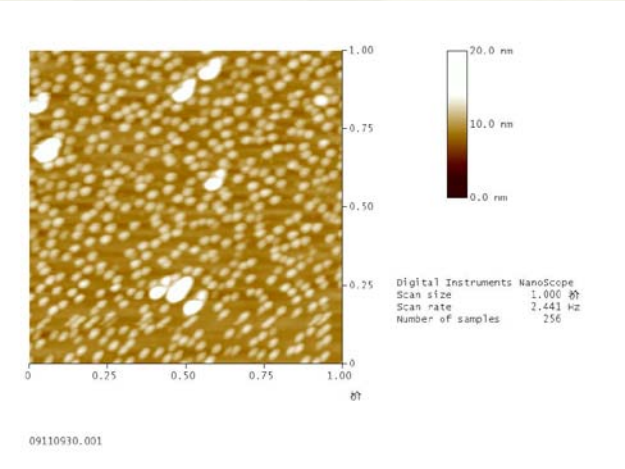
starting powders and controlling the vaporization of PbO is key to achieving high-grade targets.

In the meantime, you can obtain the large

InGaAs/InAs/InGaAs
α1.3

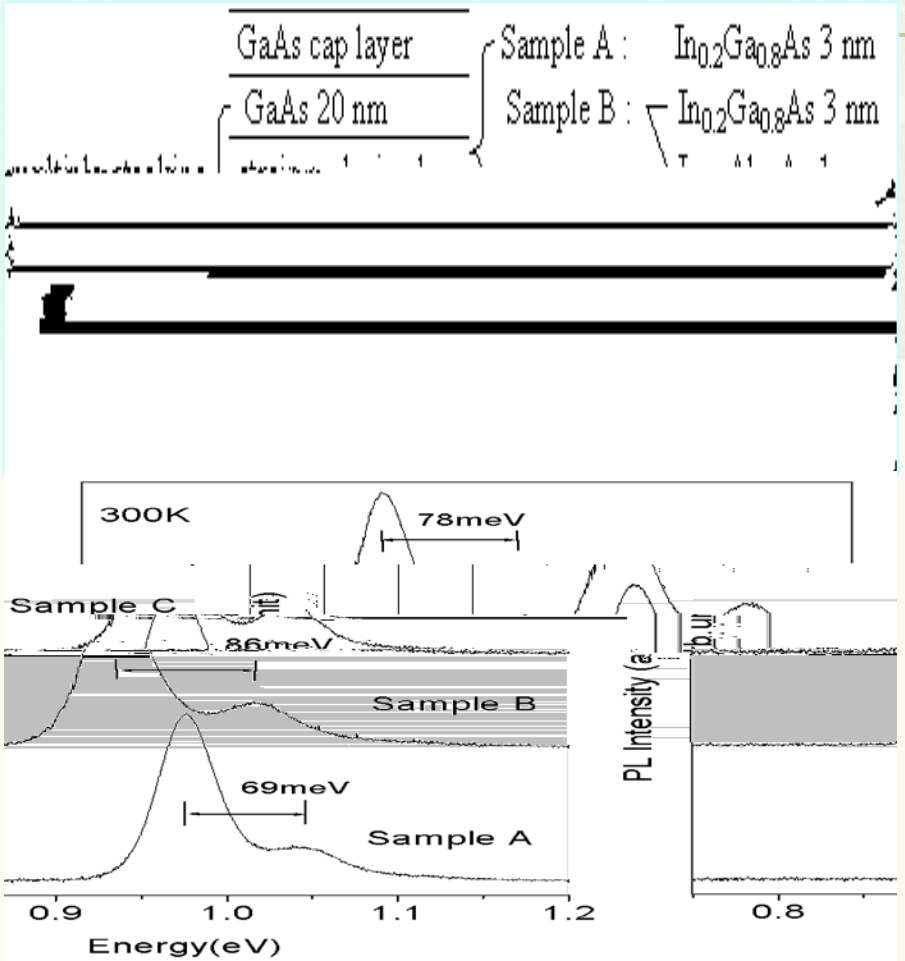
QD 4.1E+10/cm2

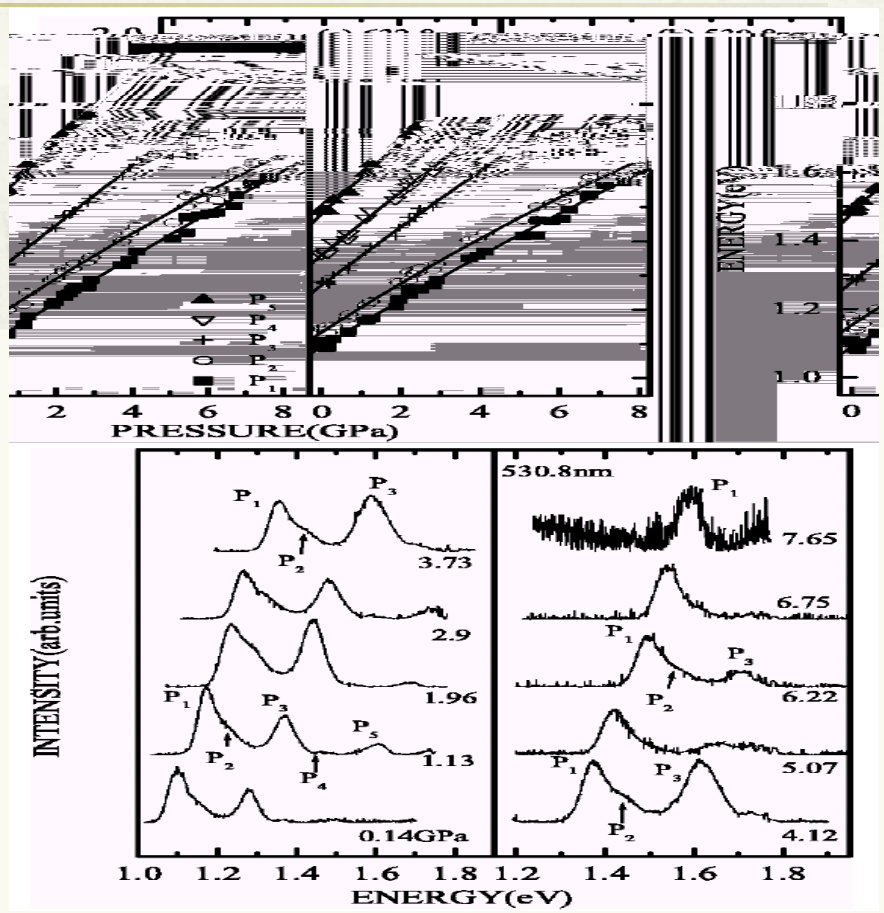




GaAs	Cap
InGaAs	QW
InAs	QD
GaAs	Buffer

1.3 InAs ㄱㄱ ㄱㄱ

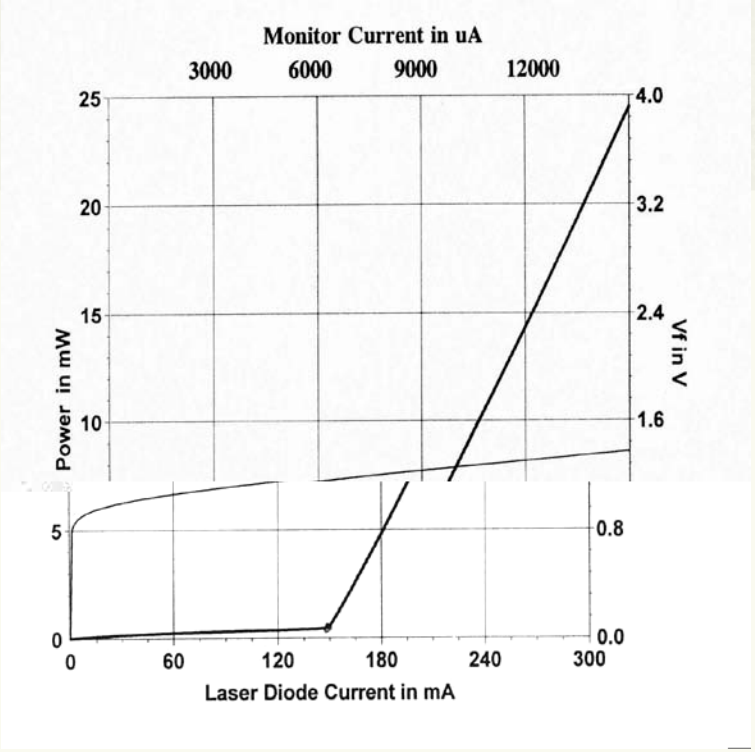


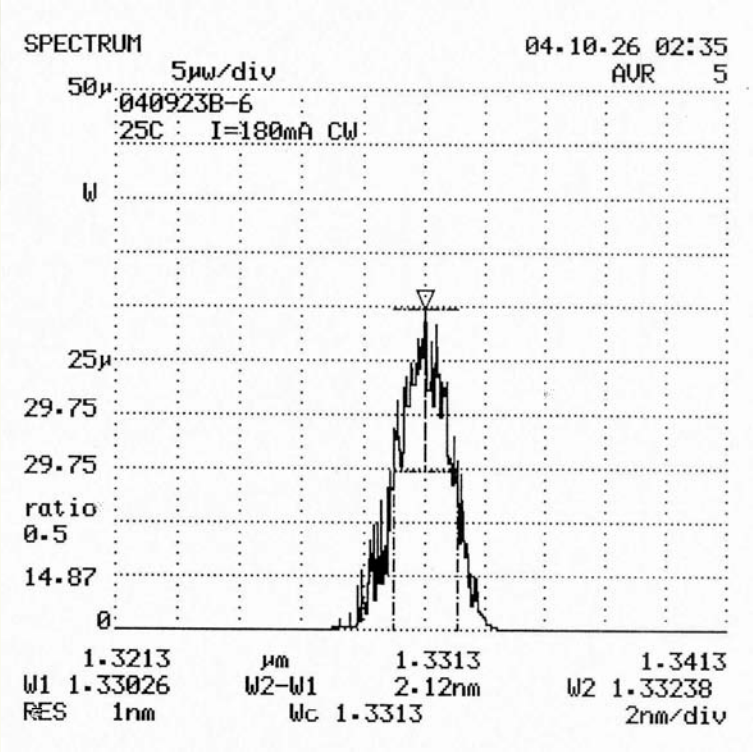


J. Phys.Conden. Mat. 15, 5383(2003)

J. Appl. Phys. 95, 933(2004)

GaAs 1.3 ↳ ⅄





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III-Vs REVIEW THE ADVANCED SEMICONDUCTOR MAGAZINE
III-Vs REVIEW The leading compound semiconductor magazine
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- 22 November 2004 -

China's work on the GaAs gauntlet

A research group headed by Prof. Niu Zhichuan from the State Key Laboratory for Semiconductor Superlattice & Microstructures affiliated to the CAS Institute of Semiconductors has succeeded in developing a GaAs-based long-wavelength laser device: InAs/GaAs self-assembly quantum dot laser with lasing wavelength of 1.33μm under continuous-wave operation mode at room temperature.

Experts say this is the most important achievement in the field of GaAs-based near-infrared long wavelength materials and devices in China in recent years.

The most important kinds of GaAs-based semiconductor materials working for near-infrared wavelength from 1.2 to 1.7μm are in the form of InAs self-assembled quantum dots, GaInNAs and GaInNAsSb quantum wells.

The QD structures attract scientists as they excel in a high-speed operation with lower power consumption and new functions. The QWs are new multi-element compounds noted for their temperature stability. In recent years, these new semiconductor materials became a research focus in the most developed Western countries.

Since the end of the 1990s, a special research group headed by Prof. Niu at the CAS Institute of Semiconductors was funded for their work in the field. In order to speed up the research tempo, the team is composed of researchers from various fields ranging from material growth, physics analysis to device technology.

The first step for researchers in their success was the breakthrough attained before 2000 in the technology of MBE of the InAs-based quantum dots lasers for the 0.9-1.3 μm wavelengths.

By 2002, in the second stage, they succeeded in acquiring the 1.3μm QDs with high uniformity and high photoluminescence efficiency at room temperature.

The newest development over the last two years includes the solution of a knotty problem in the growth of such QDs with long wavelength and high density over 4.0E+10/cm2, and the fabrication technology of InAlGaAs QD lasers for 1.3μm wavelength.

Compound Semiconductor - News - Chinese team produces quantum dot laser (November 2004)

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Institute of Physics UK

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8/11/2004)

1330nmGaAs

InAs

1.3

InAs

2 InGaAs(NSb)

InGaAs Э 1.2

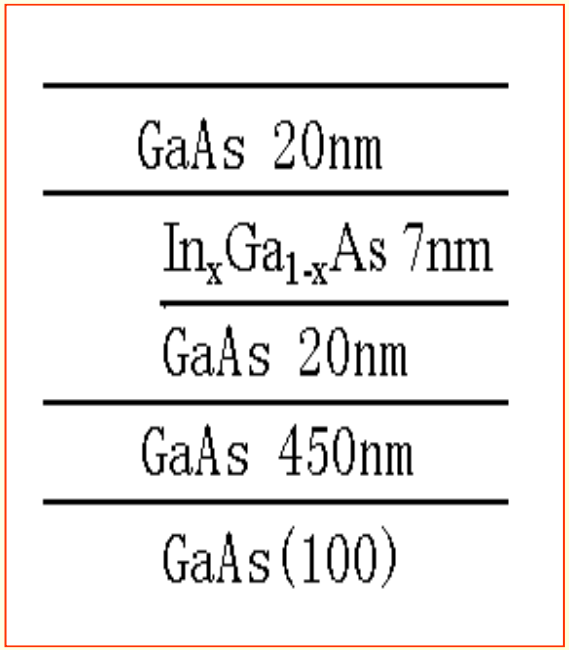
1.3-1.5

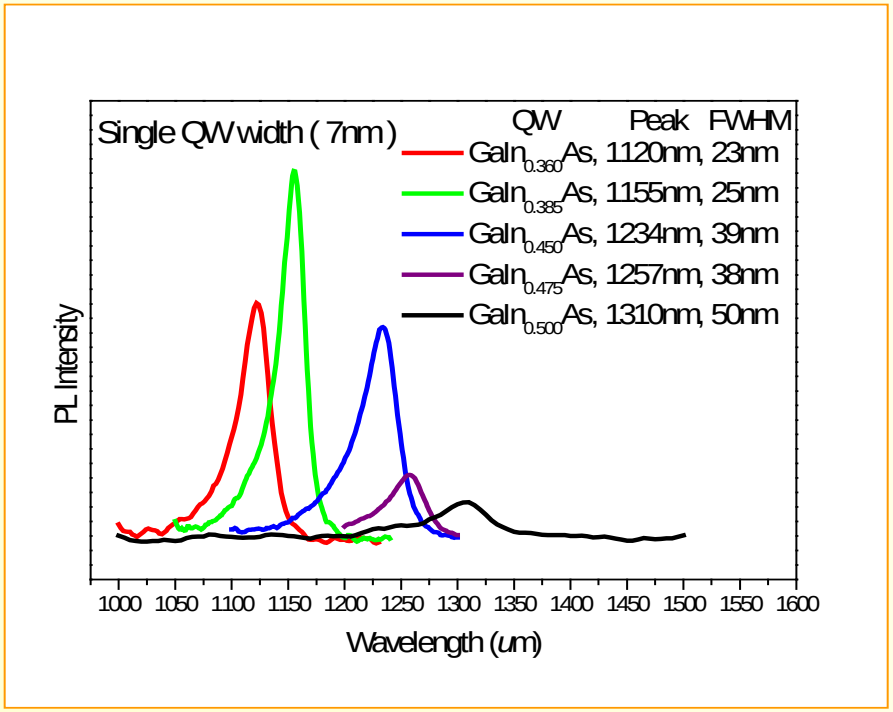
1.3

N Sb

GaInNAsSb/GaNAs/GaAs

1 ↓InGaAs/GaAs ↓ Э 1.26





ж¯ 200310119746.6; 2004 MBE ¨ Late News ¨ ˆ ;
Appl.Phys.Lett,84,5100(2004)

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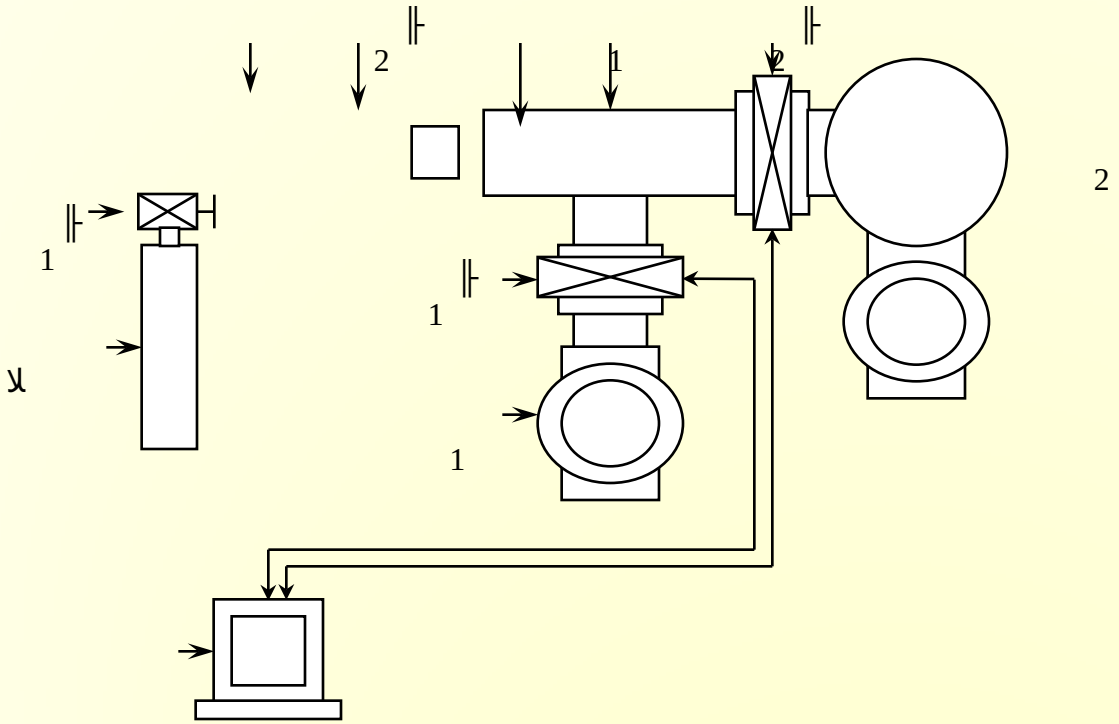

1.3 GaInAsN 丬

GaInNAs/GaAs

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Photonics Lab., Chalmers University of Technology, SWEDEN

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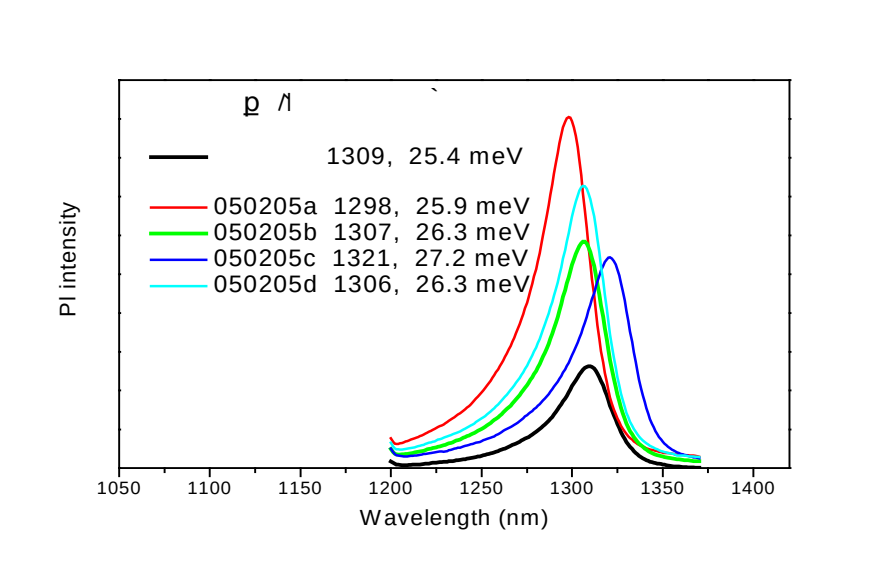
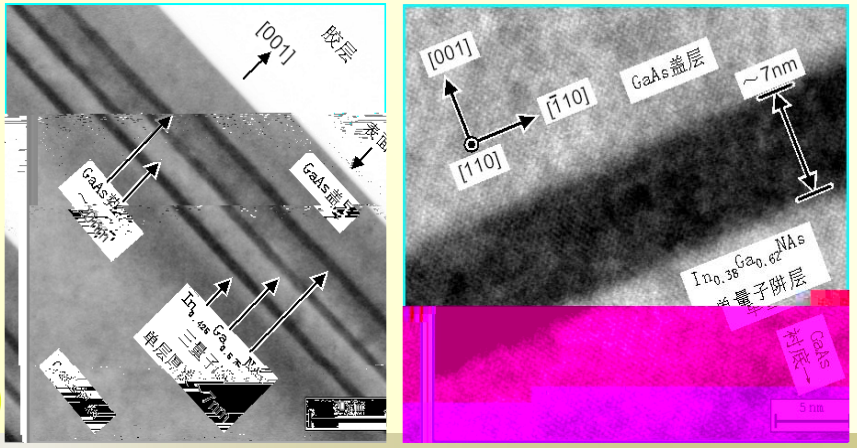


TEM GaInNAs



APPL. PHYS. LETT. 87, 161911(2005)

In GaInNAs N

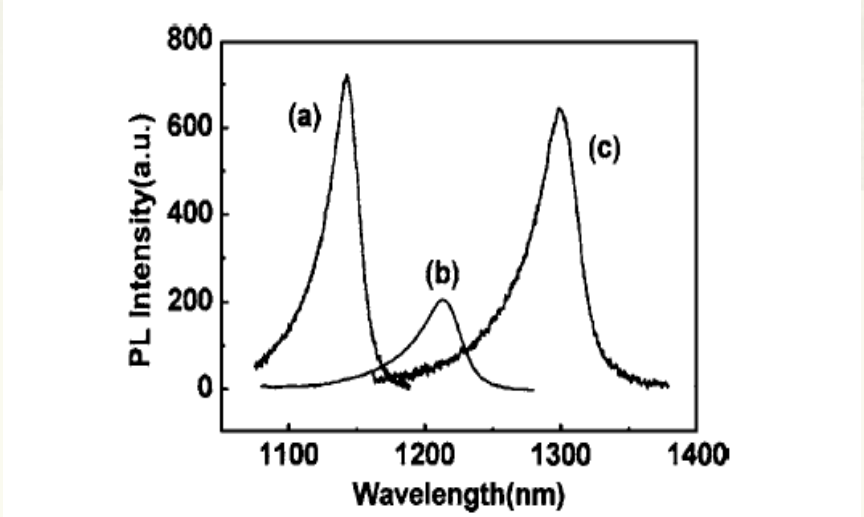


FIG. 3. RT-PL spectra of the GaIn(N)As/GaAs 3QWs at excitation power of 15 mW. (a) $In_{0.36}Ga_{0.64}As$ 7 nm/GaAs, (b) $In_{0.36}Ga_{0.64}As$ 7 nm/GaAs, and (c) $Ga_{0.575}In_{0.425}N_{0.01}As_{0.99}$ 6 nm/GaAs.

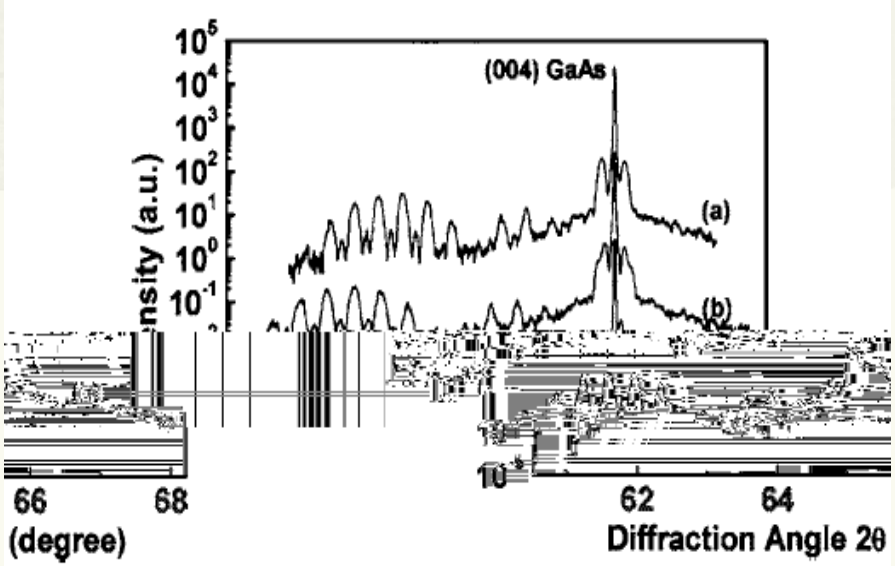


FIG. 2. Measured (004) x-ray rocking curves of the GaIn(N)As/GaAs $Ga_{0.575}In_{0.425}N_{0.01}As_{0.99}$ 3QWs: (a) $In_{0.36}Ga_{0.64}As$ 7 nm/GaAs, (b)

In N

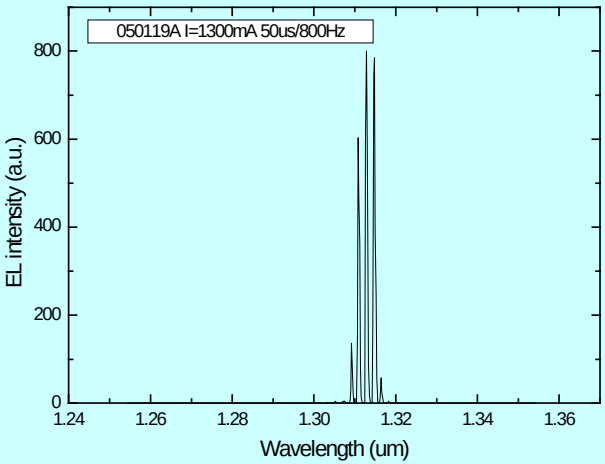
APPL. PHYS. LETT. 87, 161911(2005)

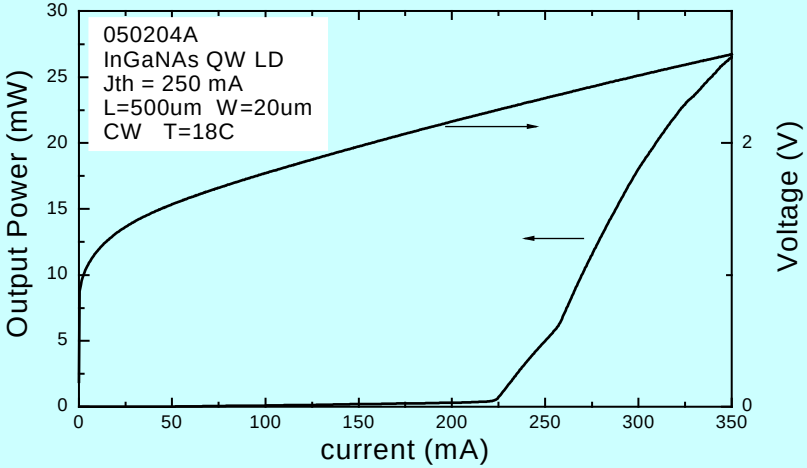
Phys. Sta. Sol. 3, 631 (2006)

1.31 GaInAsN

CW

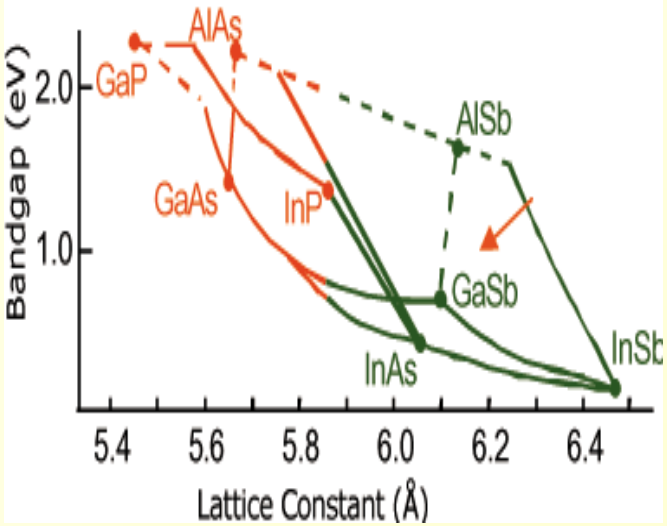
250 mA





GaInNAs 1.55

Sb



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2 ̣z ̣y

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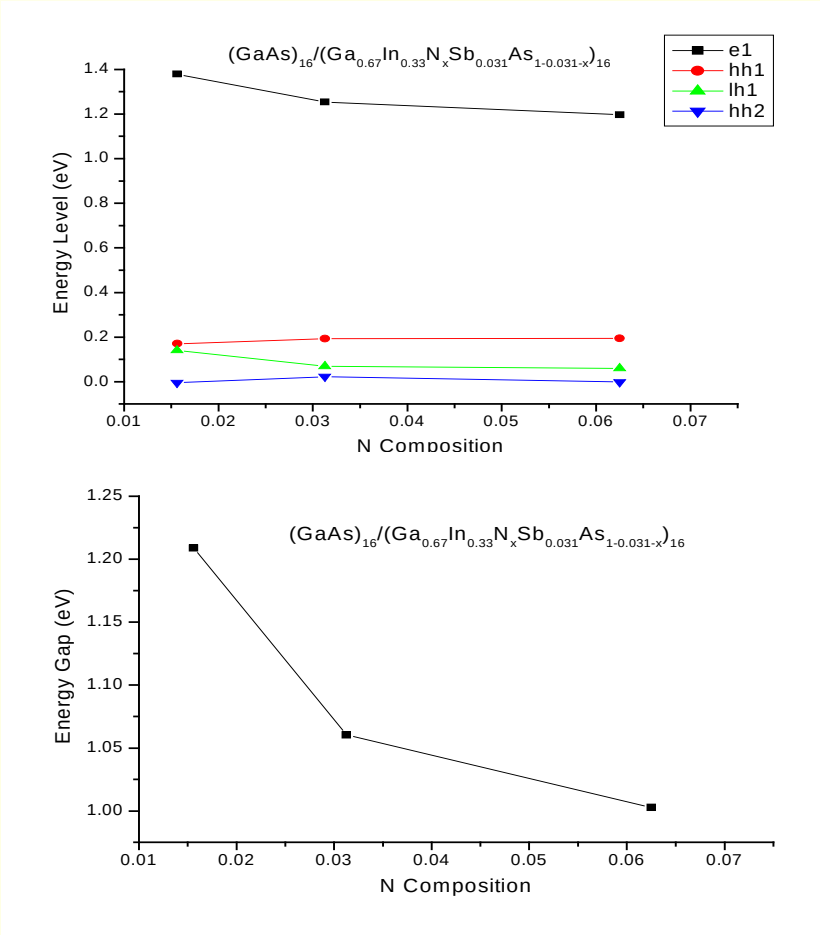
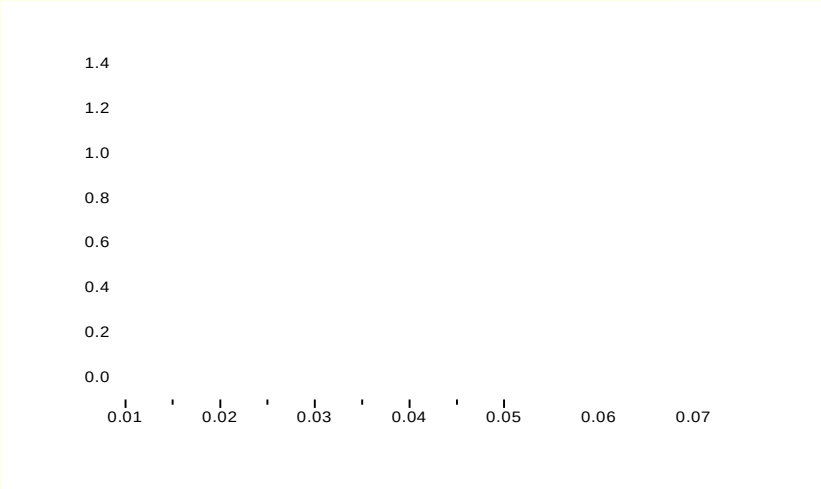
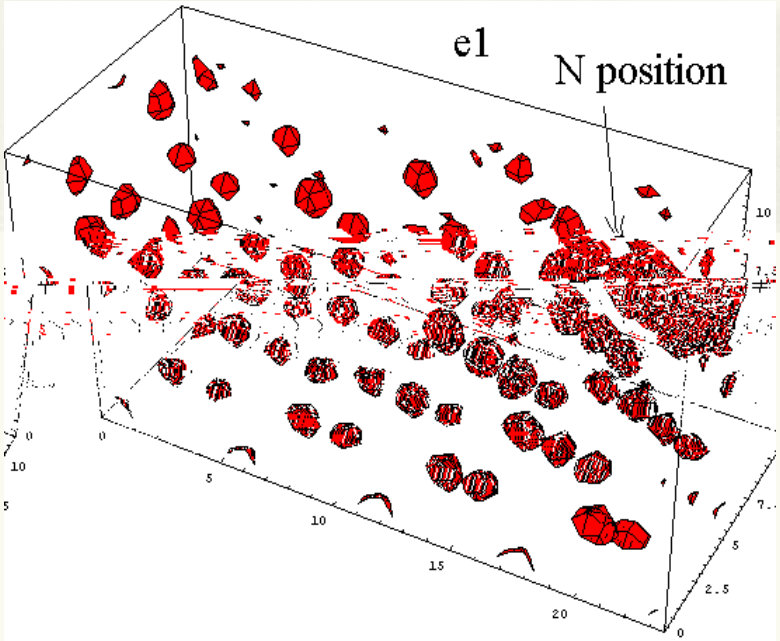
N GaAs/GaInNSbAs

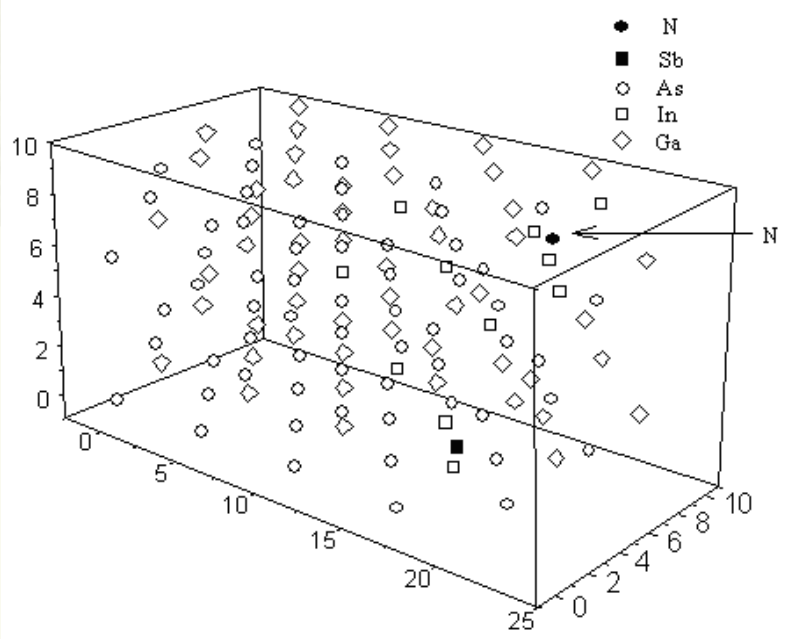




$(GaAs)_4/(Ga_{0.67}In_{0.33}N_{0.031}Sb_{0.031}As_{0.938})_4$

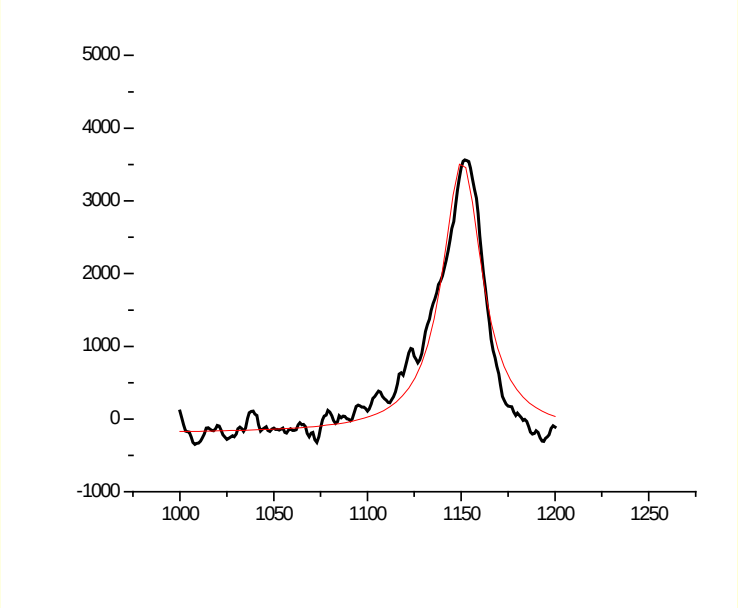


Isosurface plots of the charge densities of e1 state



Relaxed atomic position of the superlattices

Phys. Rev. B, 68, 235326, 2003


5000
4000
3000
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-1000
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1150
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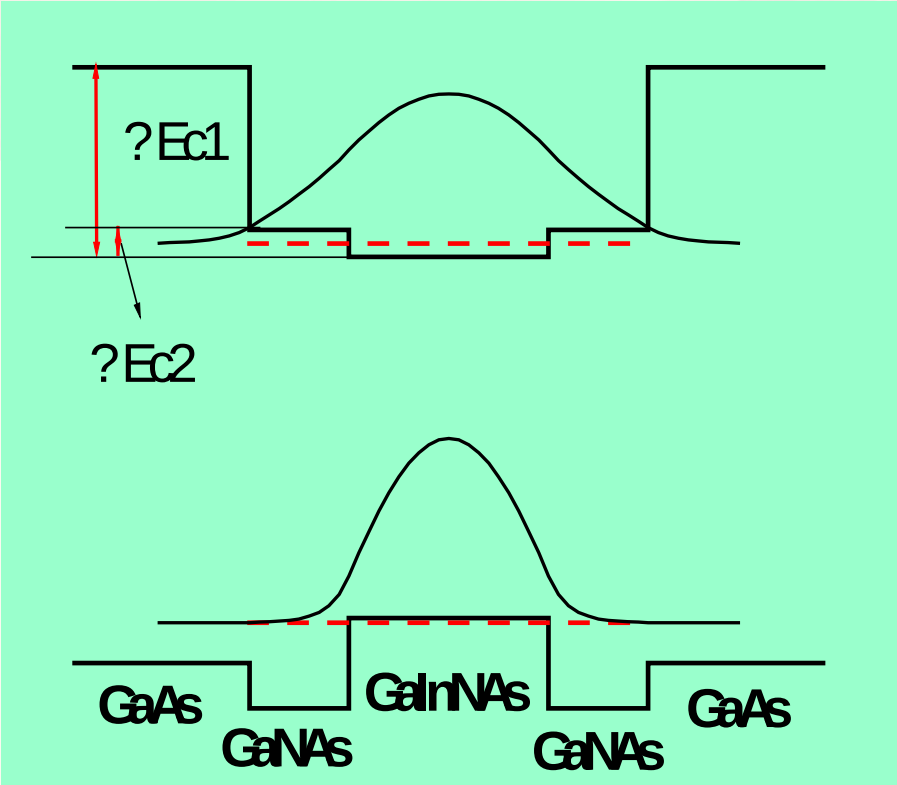
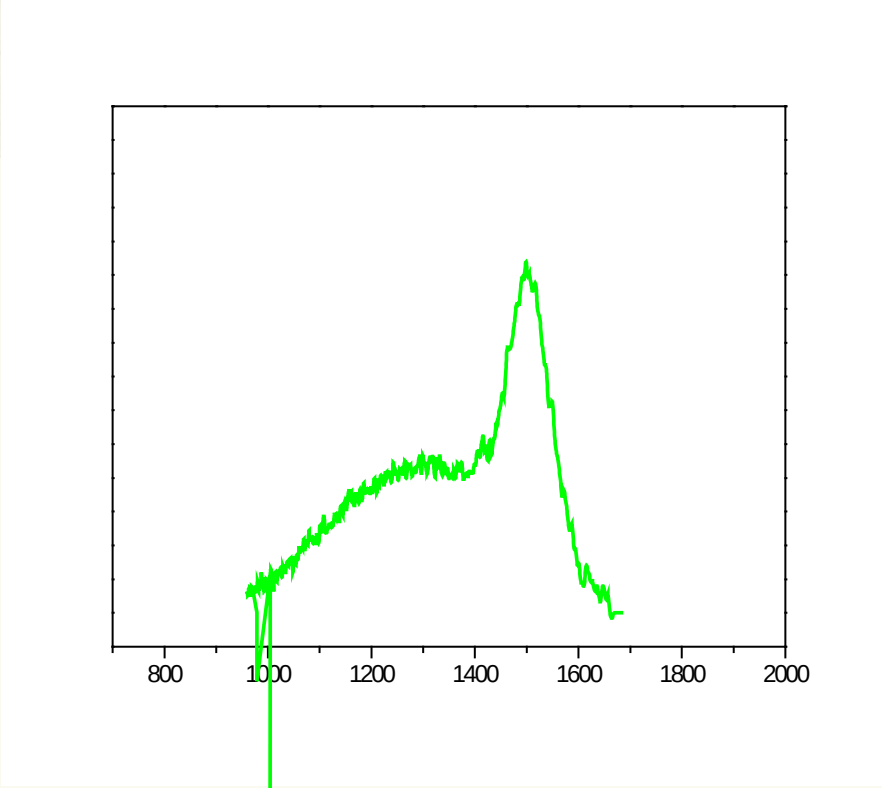
ν GaInNAsSb/GaNAs/GaAs □ غي

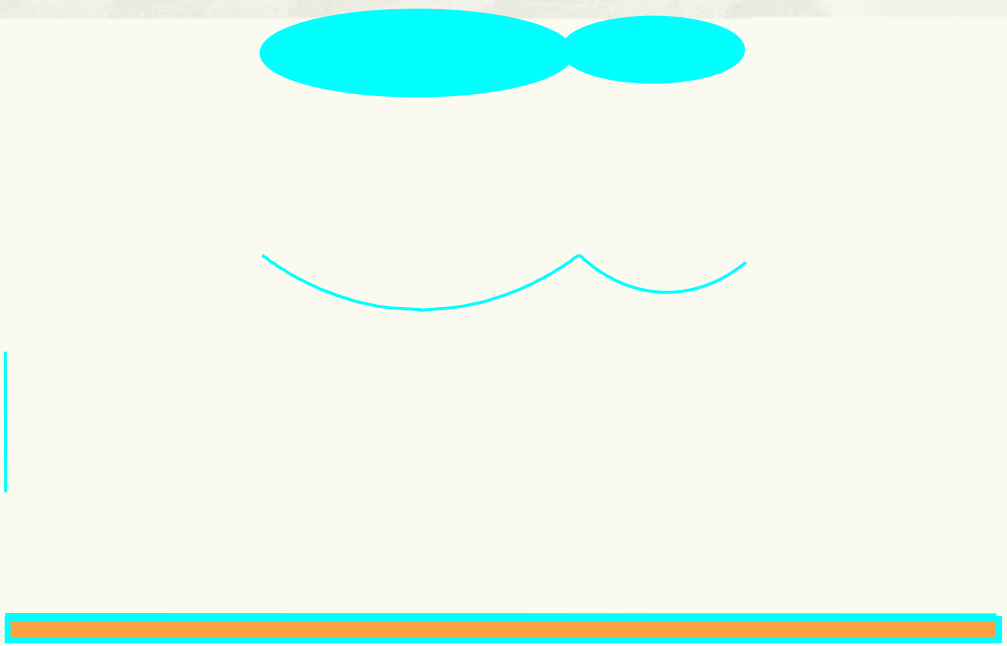
ϟ 1.55





(8~16) X	GaAs	p	953 Å
	AlAs	p	1115 Å
	GaAs	i	1398 Å
3 X	GaAs	i	200 Å
	GaInNAs	i	70 Å
	GaAs	i	1598 Å
22 X	AlAs	n	1115 Å
	GaAs	n	953 Å
	AlAs	n	1115 Å
	GaAs buffer	n	5000 Å
	GaAs Substrate	n^+	

Incident Light



MQW

AlGaAs/GaAs 850nm

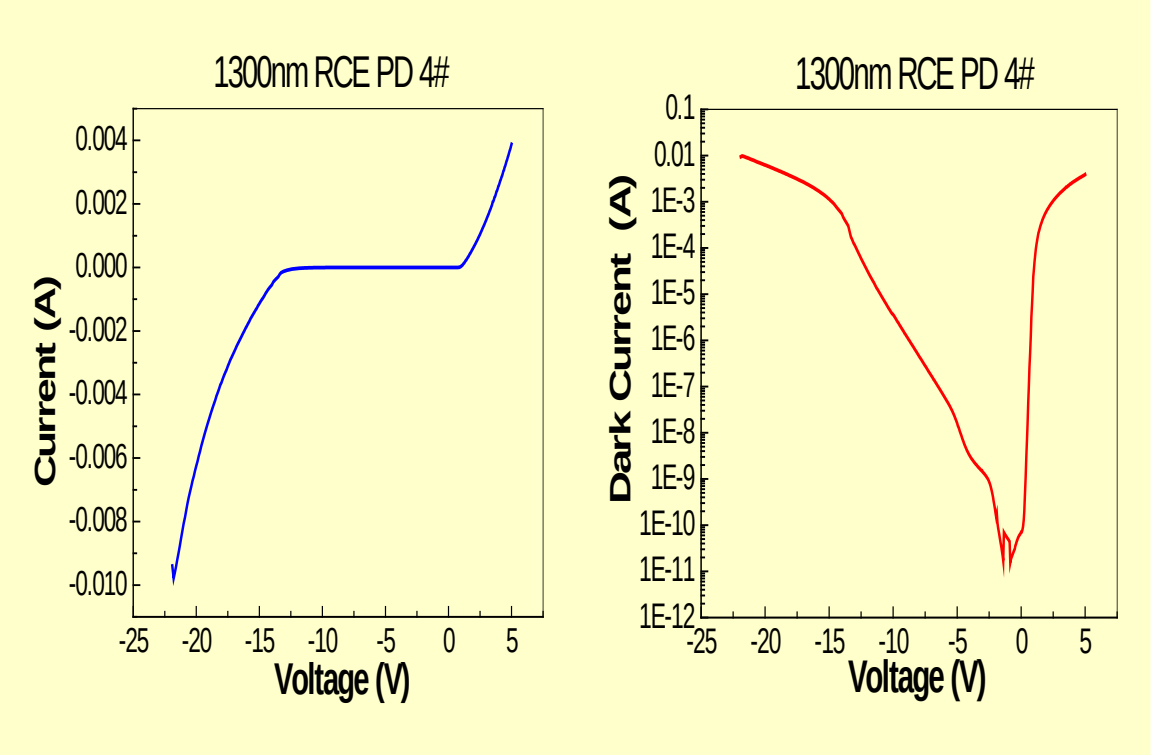
GaInAs/GaAs 980nm

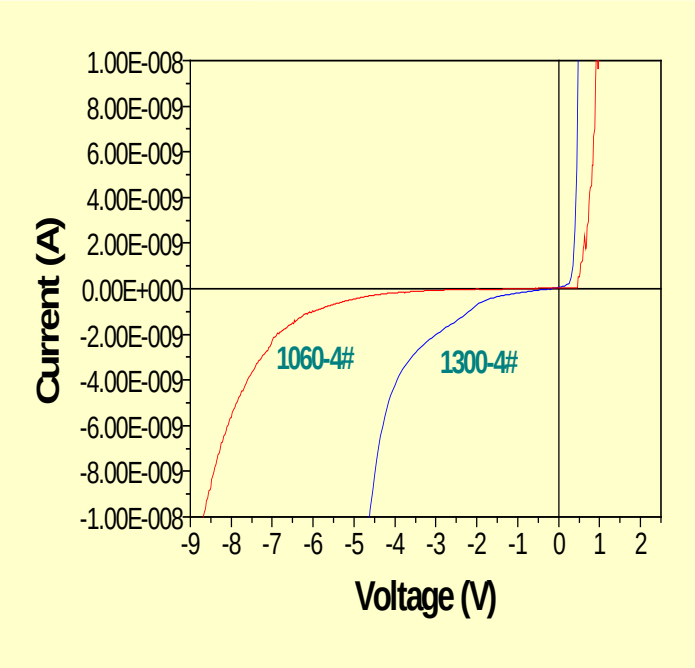
GaInAs/GaAs 1060nm

GaInNAs/GaAs 1310nm

RCE

RCE I-V





RCE

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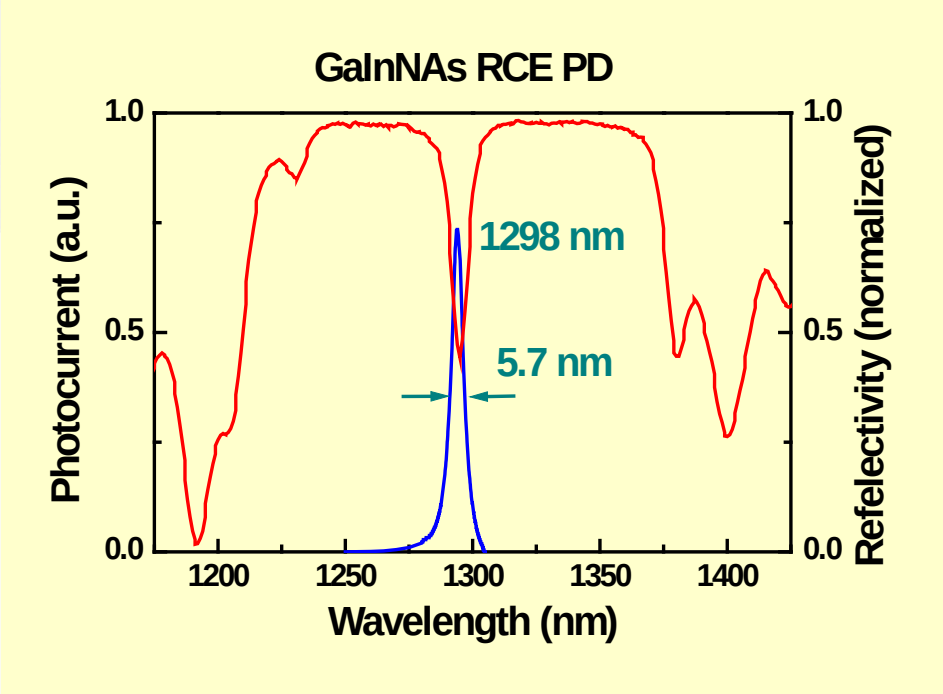
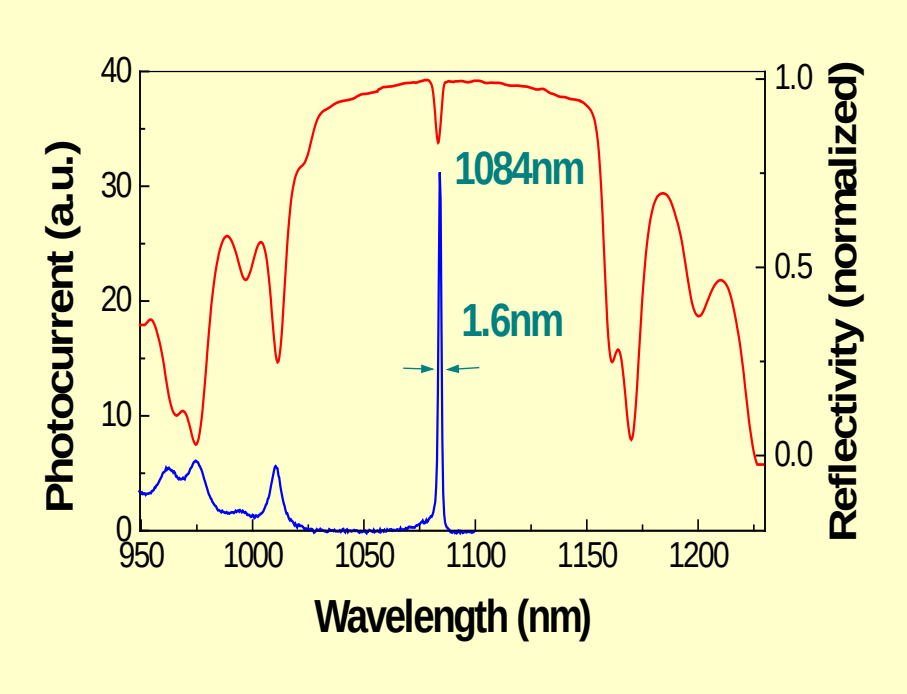
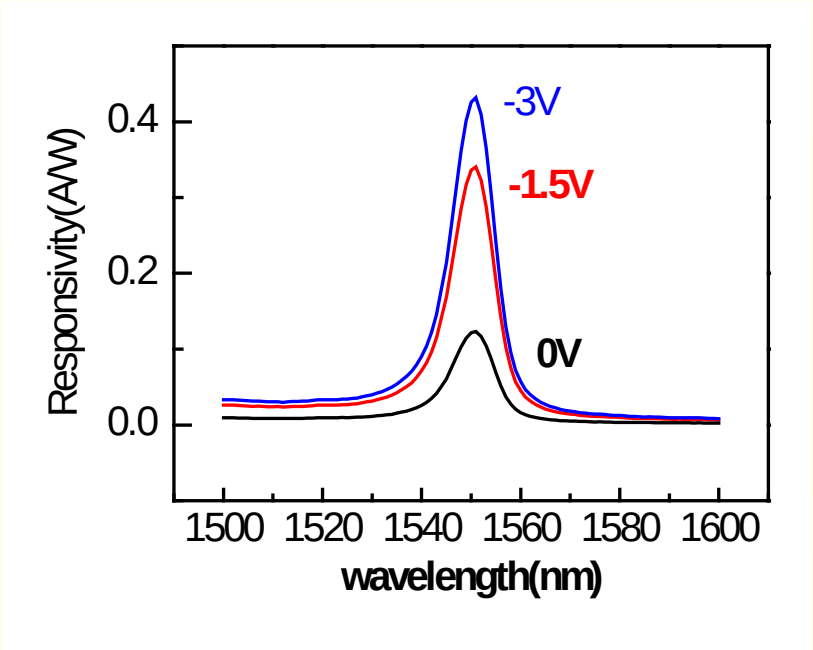
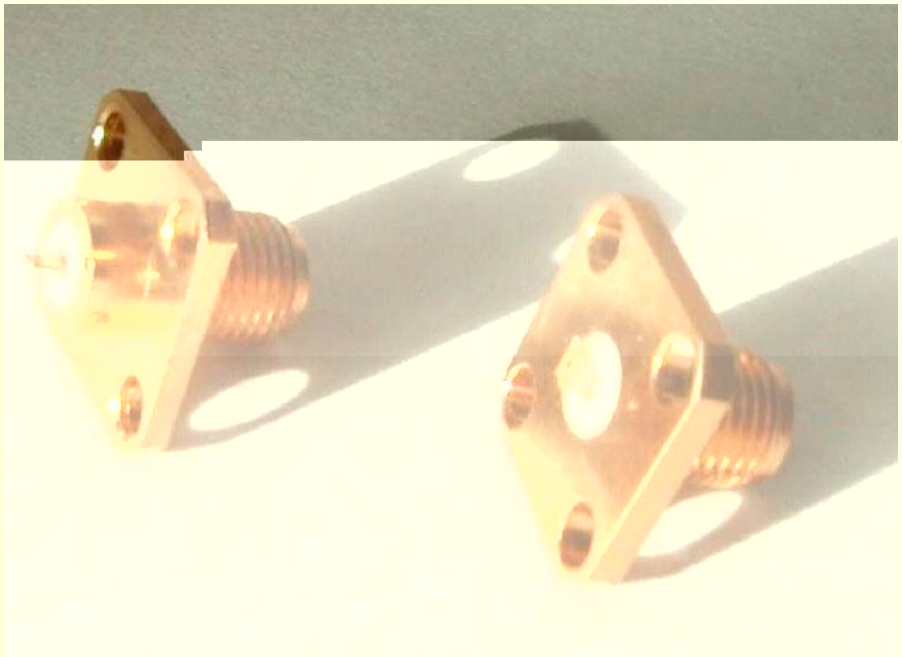




* ƎƗODBR Ɣ ƛ ƀ ƛ
ƣ ƛ Ɣ ƀ a
ƛ Ɣ a ƛ ! RCE Ɣ

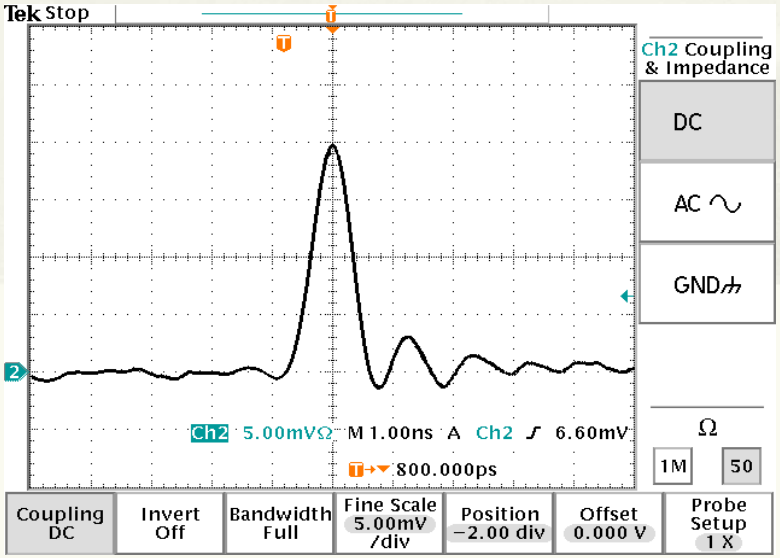
1.55 GaInAsN RCE 受



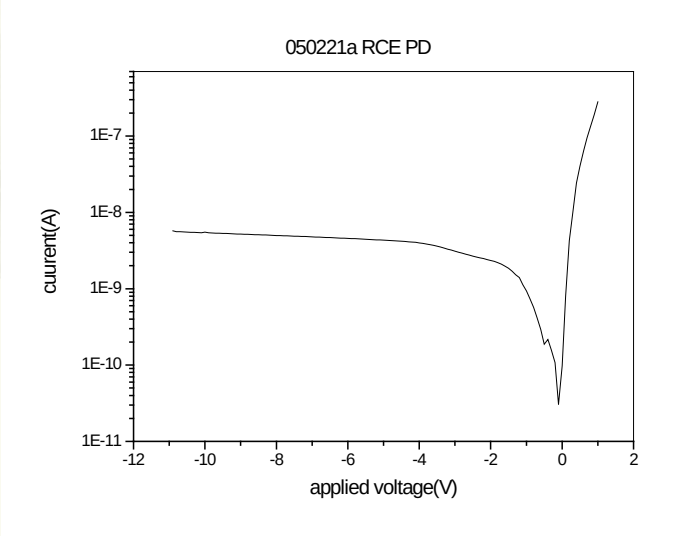


Appl. Phys. Lett. 87, 111105(2005)

1.55 RCE-PD ৲



RCE



RCE

1550,1300,1064,980 nm :

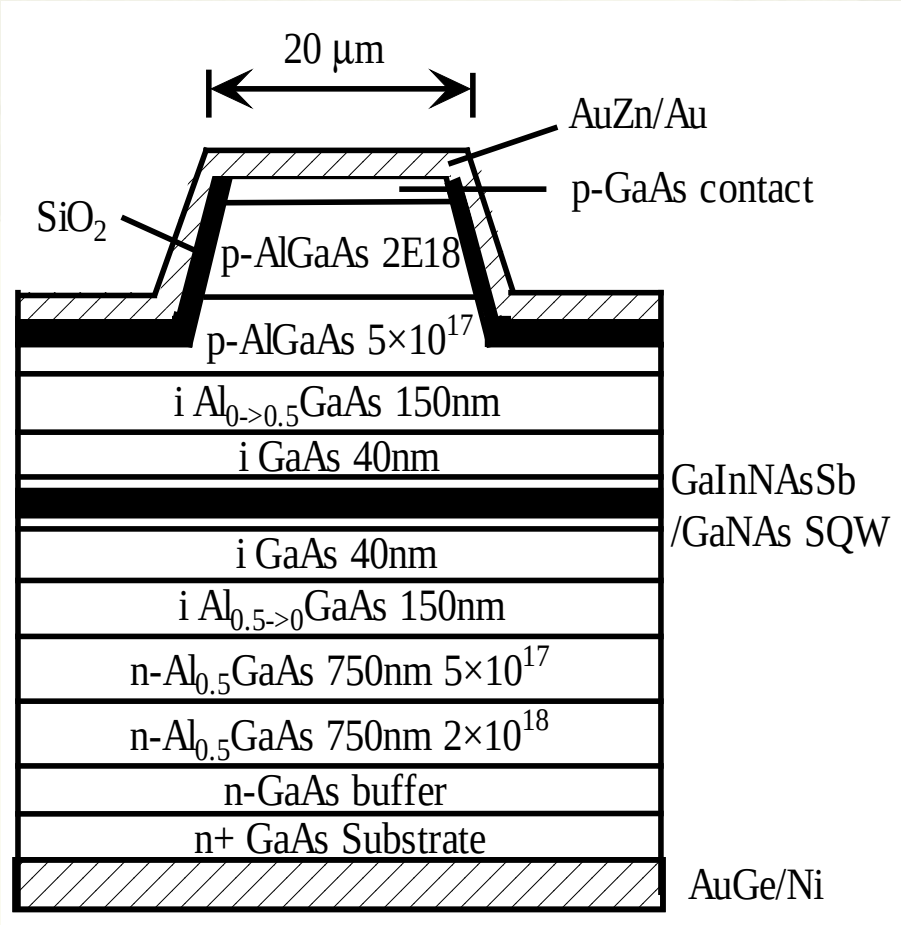
30 - 50% : λ_0, $\Delta\lambda_{1/2}$ FWHM ≈1.6 -10nm :

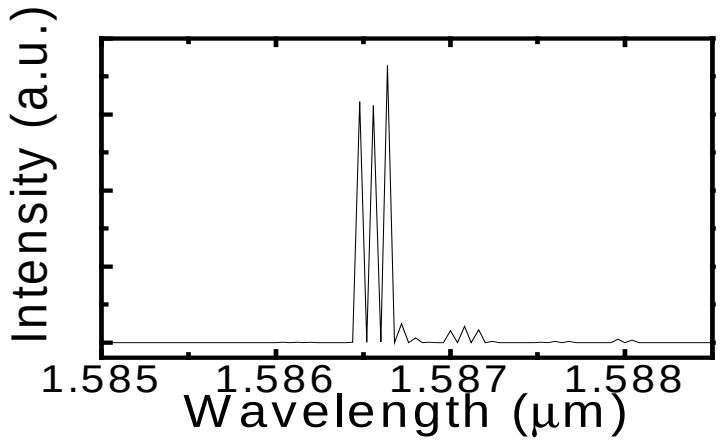
≈10^{-14}A/μm^2 : <ns ,

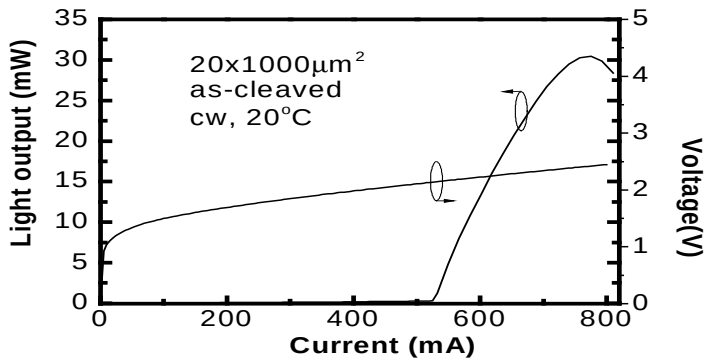
1.5

. у GaInAsNSb/GaNAs/GaAs

´ ч ы







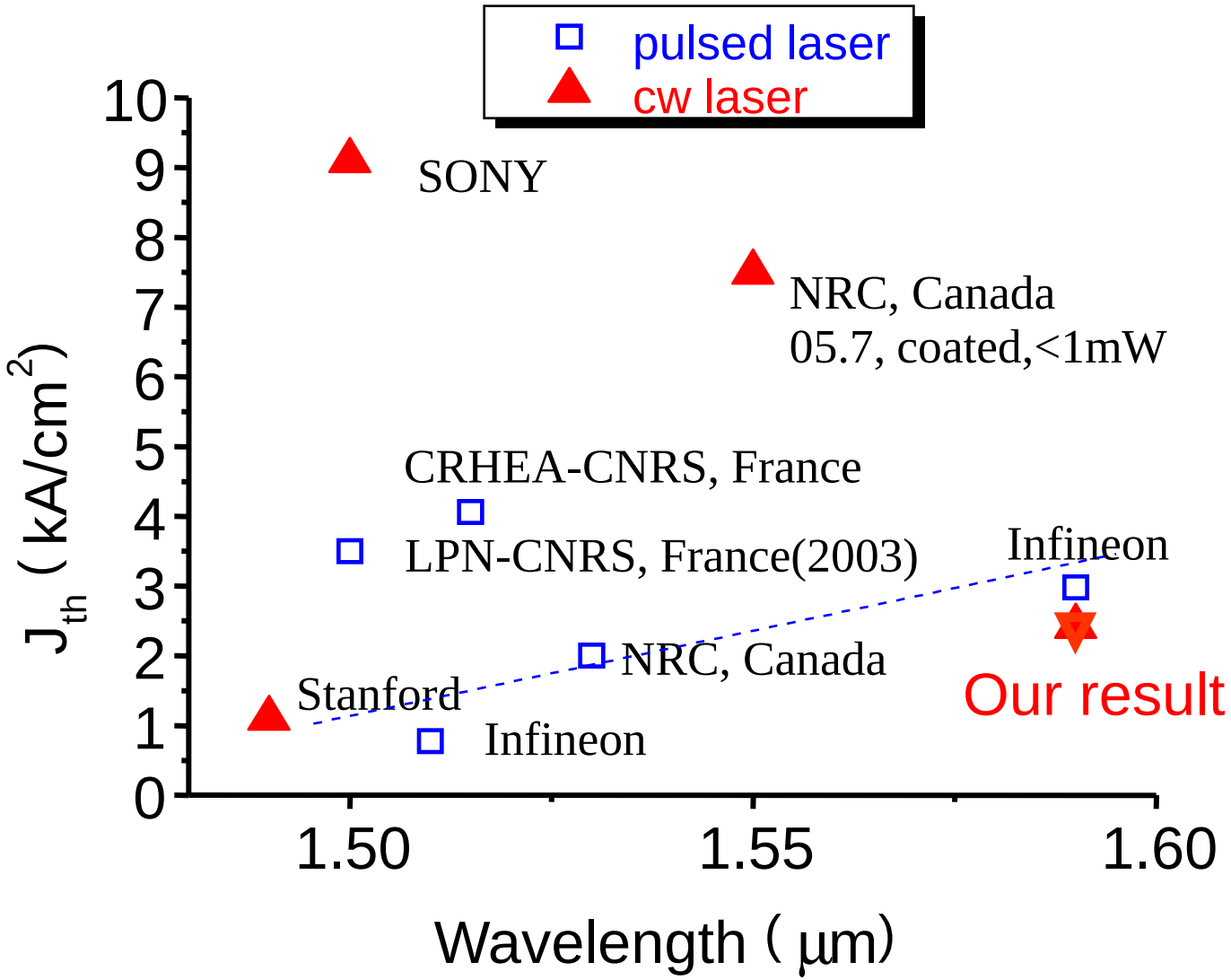
1.59

2.6 kA/cm2

20 X 1000 um^2

FP

λ 1.55 LD λ


pulsed laser
cw laser
SONY
NRC, Canada
05.7, coated,<1mW
CRHEA-CNRS, France
LPN-CNRS, France(2003)
Infineon
NRC, Canada
Stanford
Infineon
Our result
J_{th} (kA/cm^2)
Wavelength (μm)
0
1
2
3
4
5
6
7
8
9
10
1.50
1.55
1.60

GaAs 1.59 ⅄ ⅃ ∩

AZoM
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IncoTest
Featured Courses
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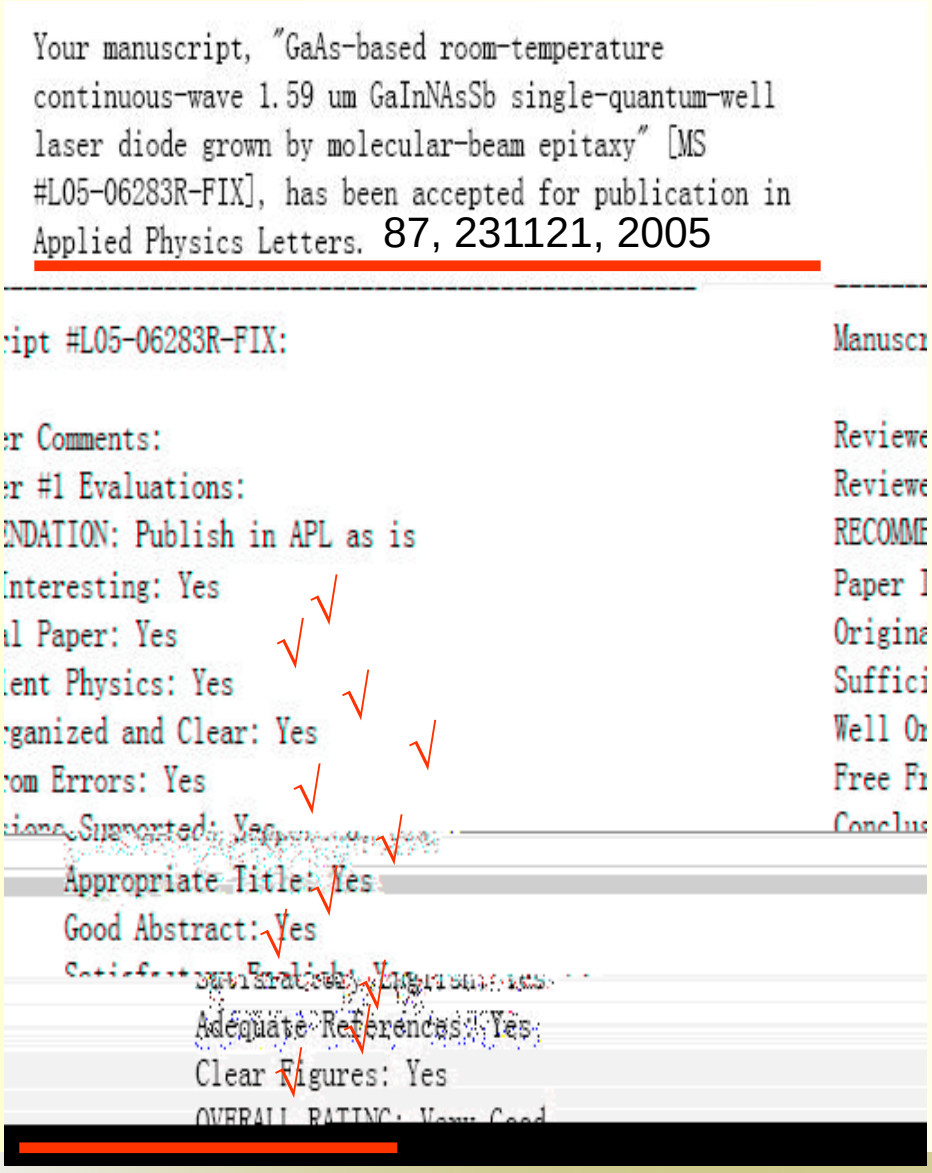
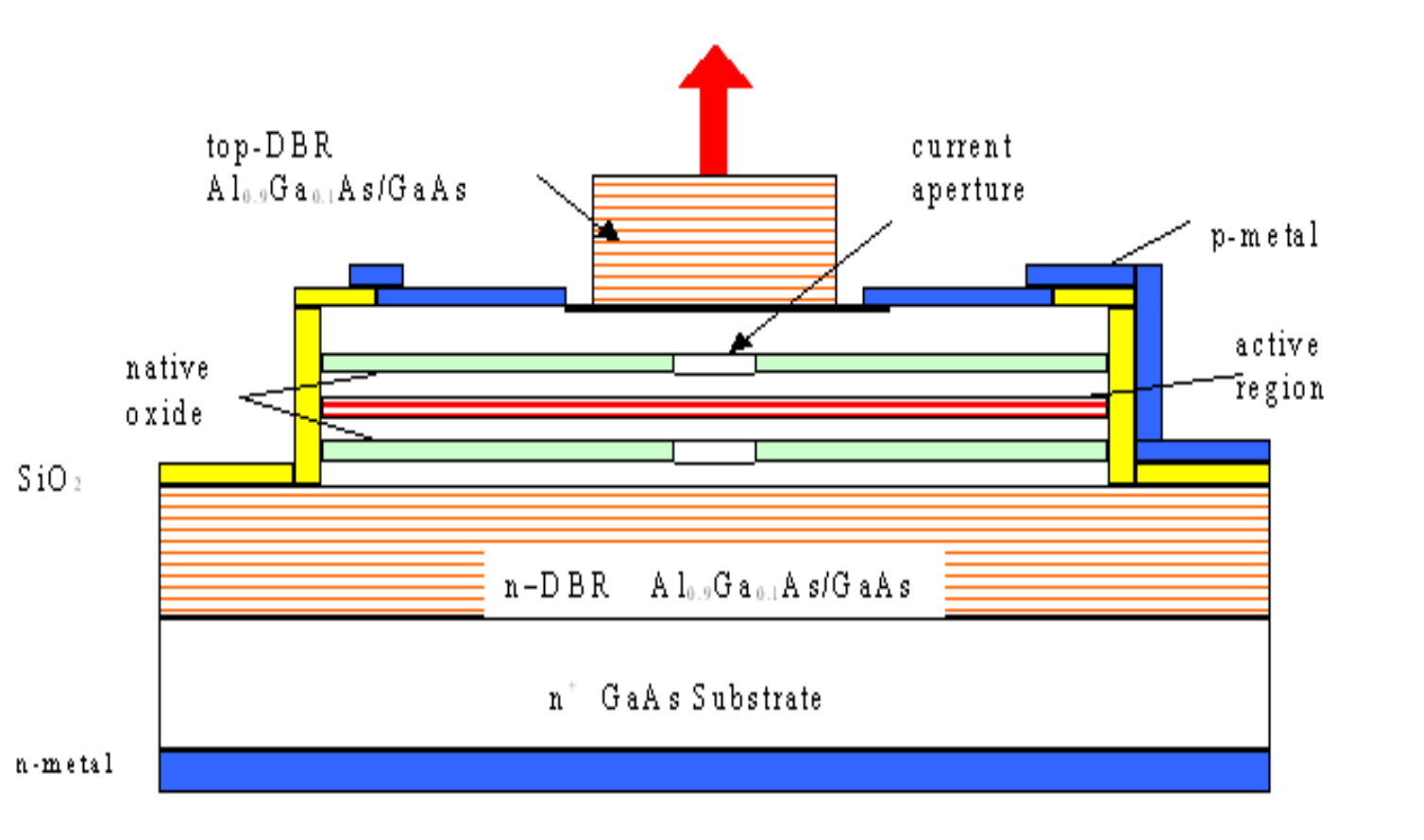
News
SUAL Group Maintains Strong Production Growth
Faraday Plastics Confirms UK
A New GaAs-Based Long Wavelength Laser Diode Developed by
Ads by Google
Optical Nanotech
Optical quantum dot nanoparticles available in commercial quantities
www.evidenttech.com
Research and Development Needs
Researchers at the CAS Institute of Semiconductors (ISCAS)
progress in their work on a new generation of the wavelength laser device.
Recently they have developed the world's first 1.586μm GaInNAsSb/GaNAs/GaAs single quantum well laser
www.modulight.com
Materials
www.goodfellow.com
Mittal Steel Company Acquires a 98% Stake in Kryvorizhstal in Ukraine
Optical Polymer Films
Low OPD, Fractional 1/4 Wave, 1/4 Wave, and Light Diffuser Film
www.optigrafix.com
abresis
The Wear Protection Pro
om/details.asp?newsID 4140
2005-10-25
http://www.azom.c

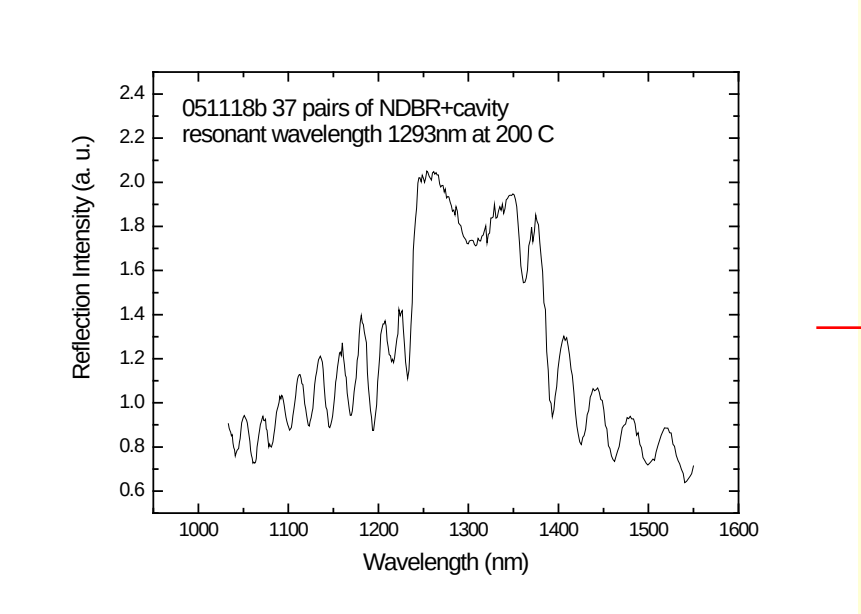

Your manuscript, "GaAs-based room-temperature continuous-wave 1.59 um GaInNAsSb single-quantum-well laser diode grown by molecular-beam epitaxy" [MS #L05-06283R-FIX], has been accepted for publication in Applied Physics Letters. 87, 231121, 2005
ipt #L05-06283R-FIX:
r Comments:
r #1 Evaluations:
NDATION: Publish in APL as is
Interesting: Yes
l Paper: Yes
ent Physics: Yes
ganized and Clear: Yes
om Errors: Yes
Appropriate Title: Yes
Good Abstract: Yes
Adequate References: Yes
Clear Figures: Yes

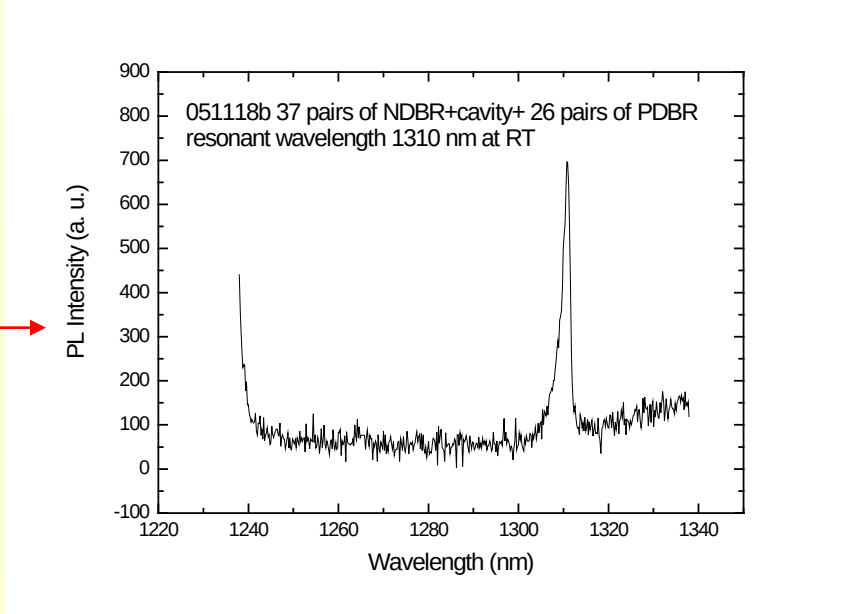
VCSEL 结构

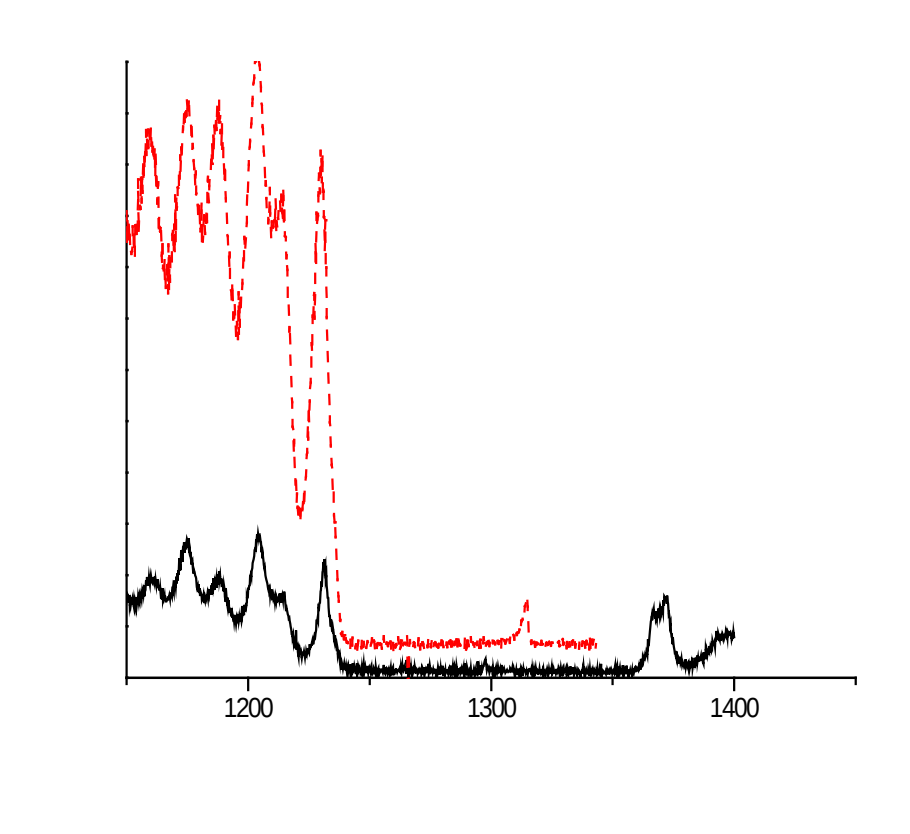

top-DBR
$Al_{0.9}Ga_{0.1}As/GaAs$
current
aperture
p-metal
native
oxide
active
region
SiO_2
n-DBR $Al_{0.9}Ga_{0.1}As/GaAs$
n^+ GaAs Substrate
n-metal

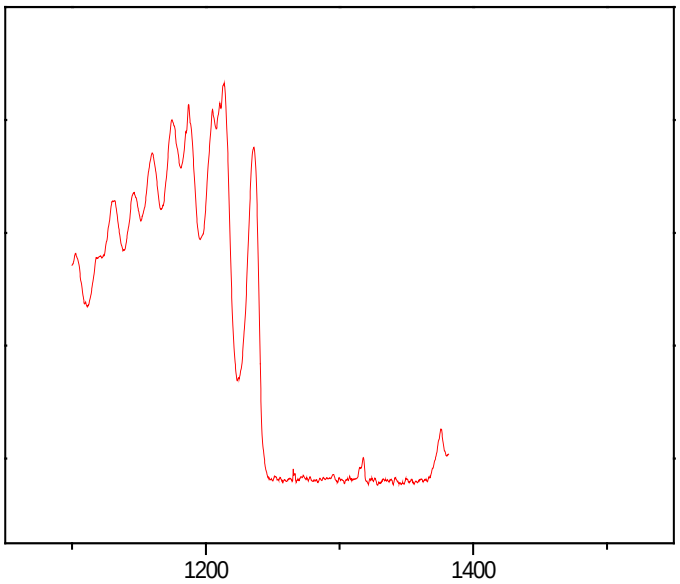
DBR VCSEL

ñ ⌟


051118b 37 pairs of NDBR+cavity
resonant wavelength 1293nm at 200 C
Reflection Intensity (a. u.)
Wavelength (nm)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
1000
1100
1200
1300
1400
1500
1600


051118b 37 pairs of NDBR+cavity+ 26 pairs of PDBR
resonant wavelength 1310 nm at RT
PL Intensity (a. u.)
Wavelength (nm)
900
800
700
600
500
400
300
200
100
0
-100
1220
1240
1260
1280
1300
1320
1340


1200
1300
1400


1200
1400

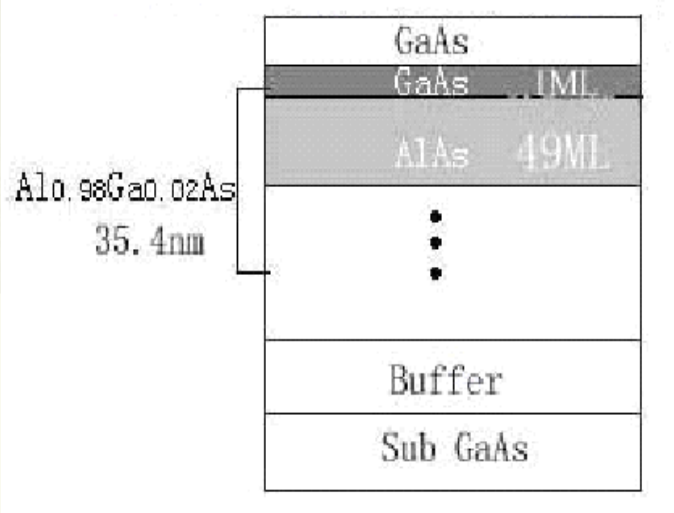
AlGaAs

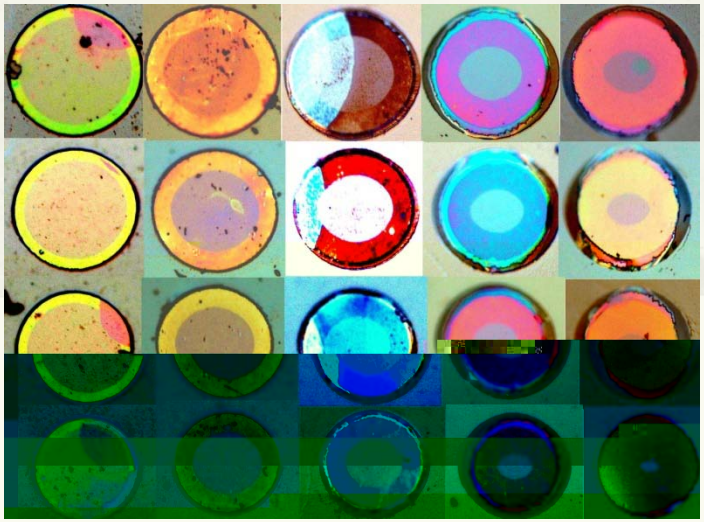
3 5

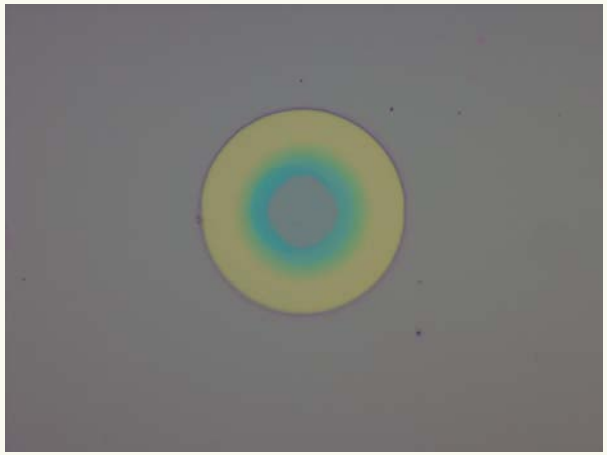
AlAs氧化反应式：

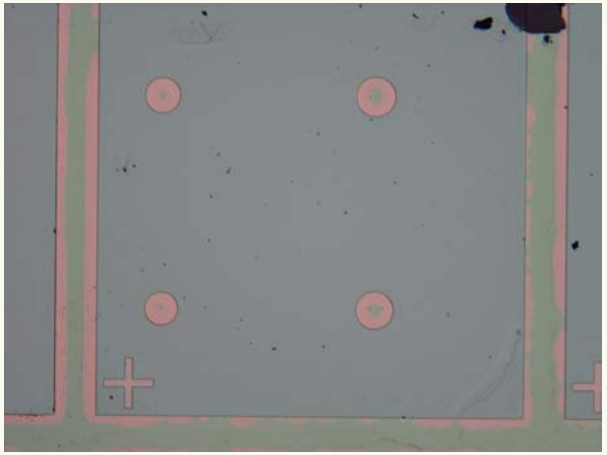
$2AlAs+6H_2O=Al_2O_3+As_2O_3+6H_2$

样品外延层结构





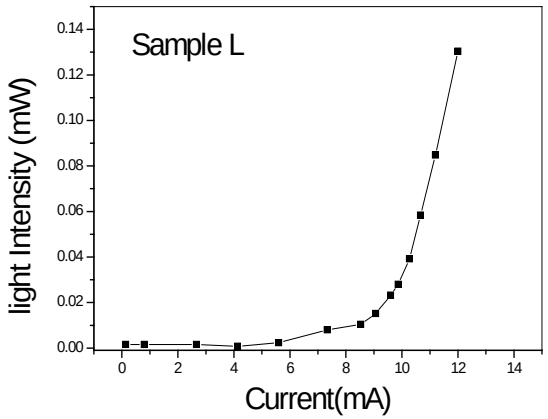


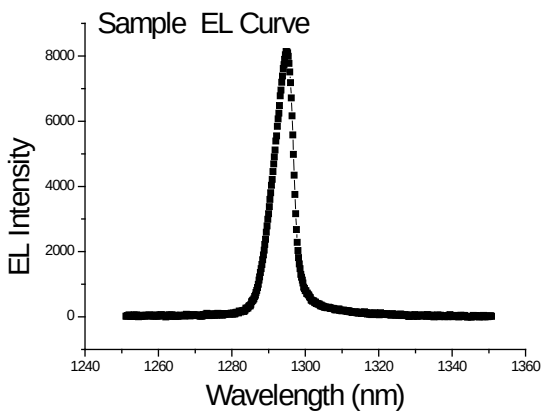


Л

У

1.3 GaInNAs VCSEL ¼ VCSEL





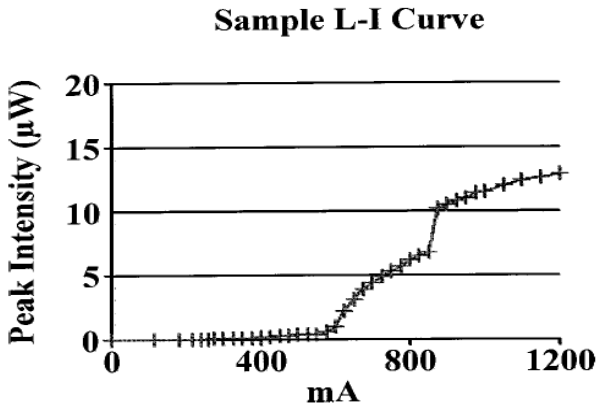


FIG. 3. Luminescence vs current curve. This particular device showed a kink at approximately 800 mA due to the onset of higher-order transverse modes.

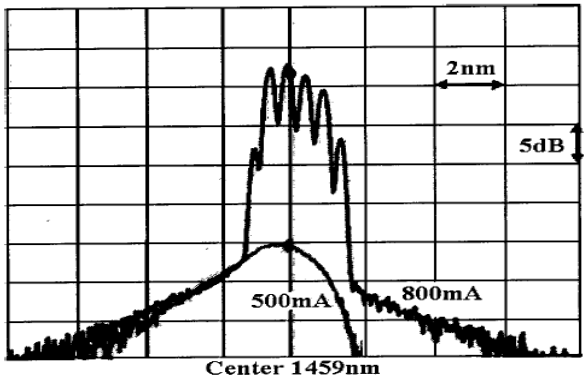
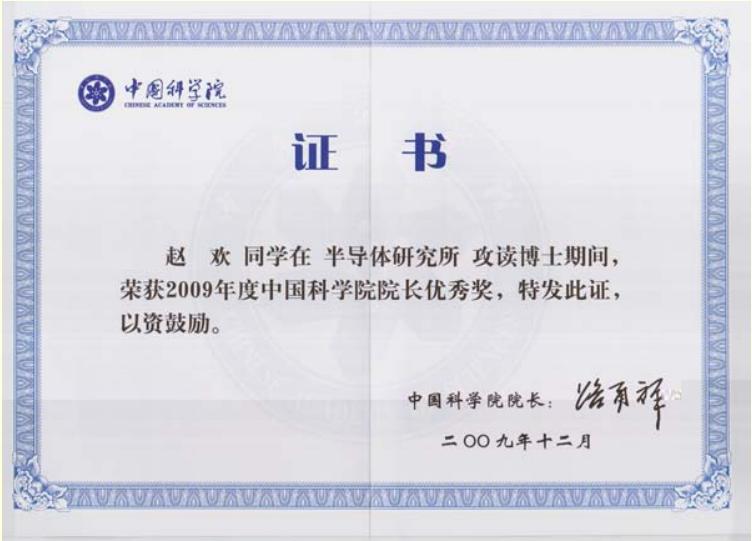


FIG. 2. Fiber-coupled spectrum of VCSEL pulsed at 500 mA (lower curve) and 800 mA (upper curve), showing onset of stimulated emission. Operated at 0.1% duty cycle and −10 °C, with 66 μm current aperture.

GaAs 研究

北京市科学技术奖

为表彰在推动科学技术进步、对首都经济建设和社会发展作出贡献的集体和个人，


中国科学院
CHINESE ACADEMY OF SCIENCES

证　书

赵　欢 同学在 半导体研究所 攻读博士期间，荣获2009年度中国科学院院长优秀奖，特发此证，以资鼓励。

中国科学院院长：

二〇〇九年十二月

中国科学院

证　书

张石勇 同学在 半导体研究所 攻读研究生期间，荣获2006年度中国科学院院长优秀奖，特发此证，以资鼓励。

中国科学院院长：

二〇〇六年七月

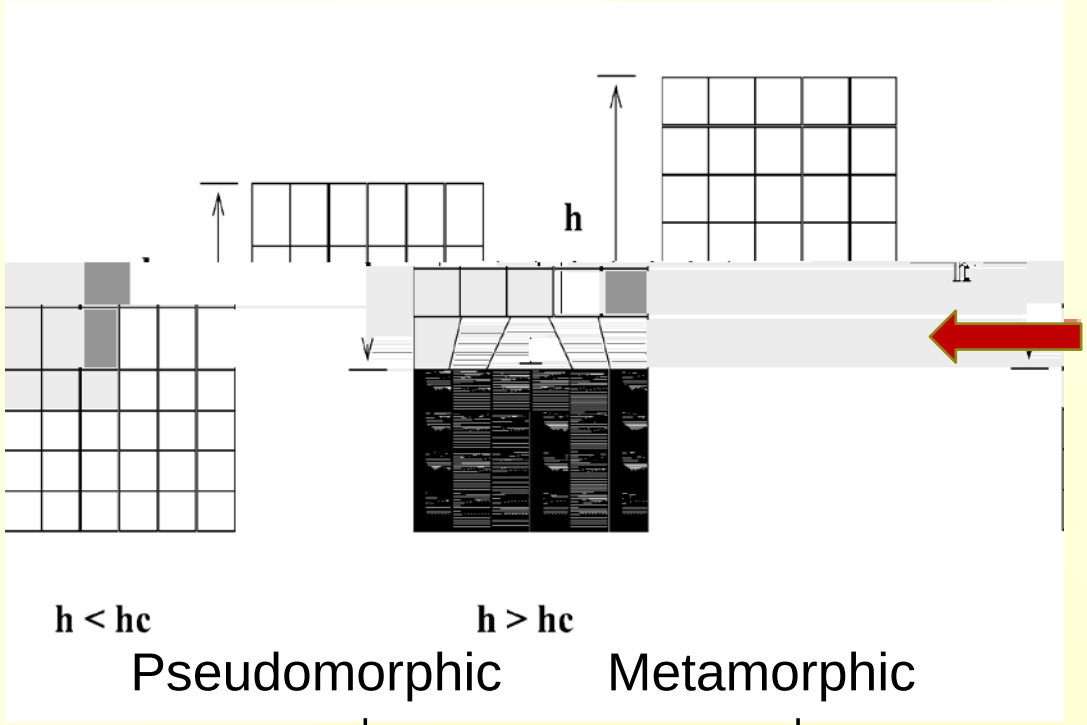
GaAs

InAs ?

N ?

metamorphic

GaAs InGaAs √



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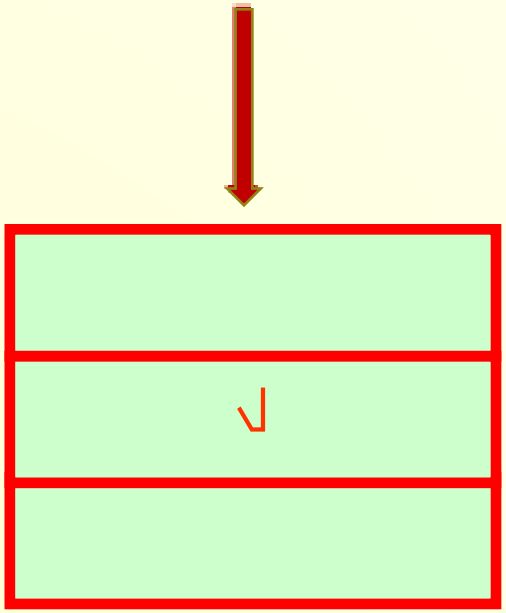
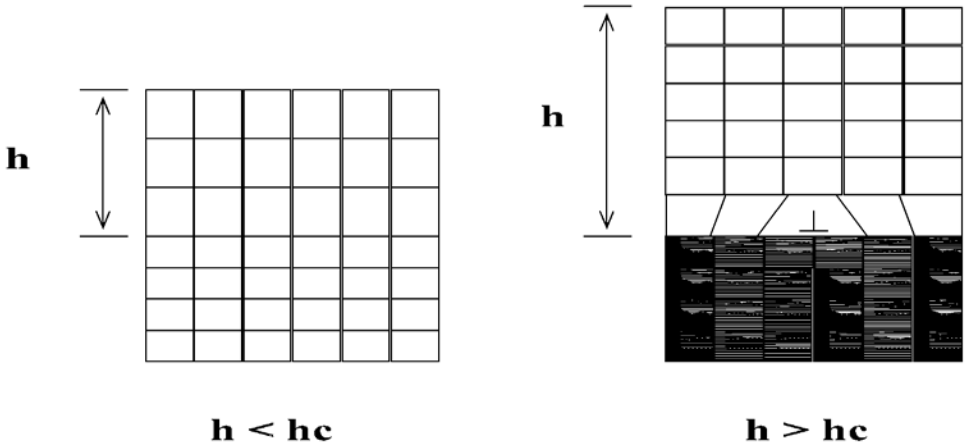
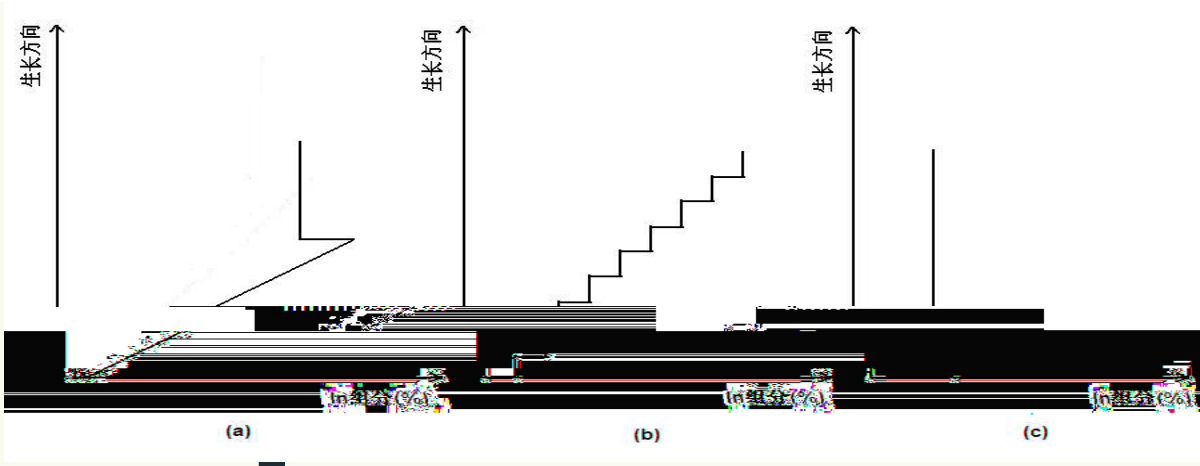


InGaAs/GaAs ↓ In ↑ . у б

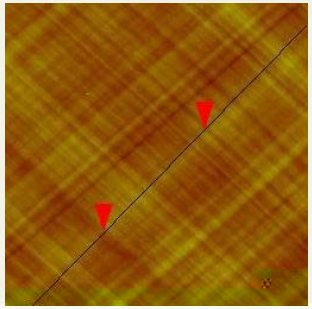


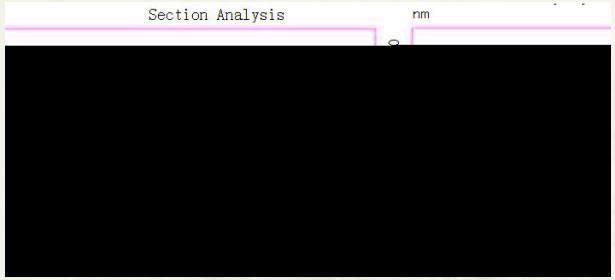


Arrhenius law:
V=A exp (-B/T)

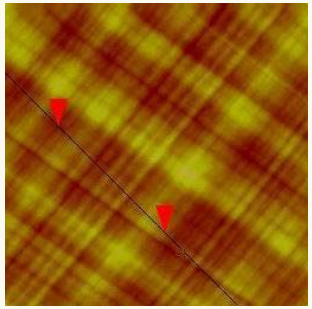
↓

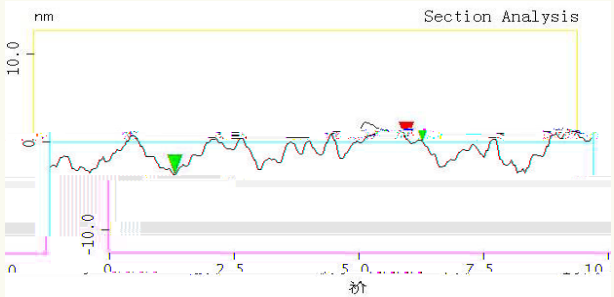
In ↑ ↓ у ↑



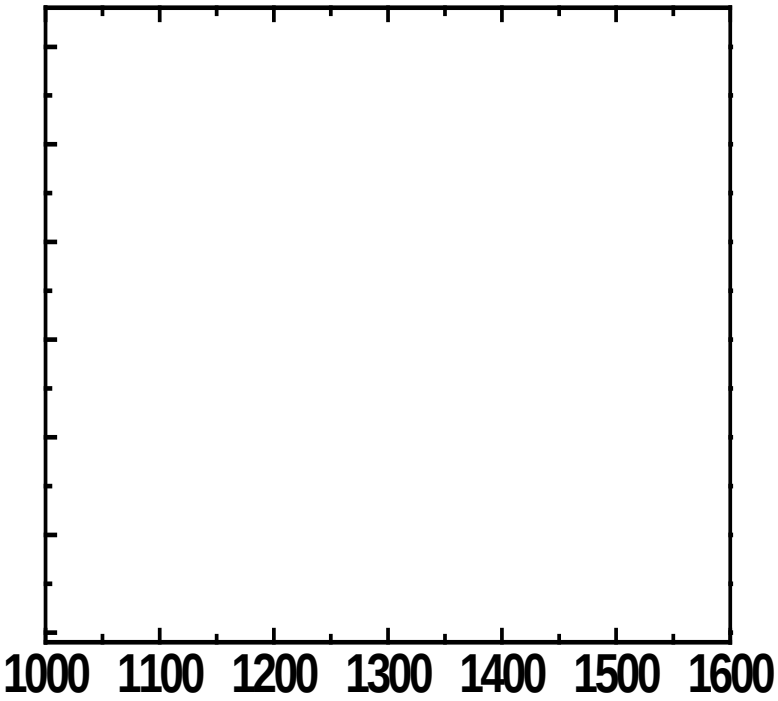


1 μm In(0.02 -- 0.25)GaAs, RMS=0.748nm,
In源温按照Arrhenius law





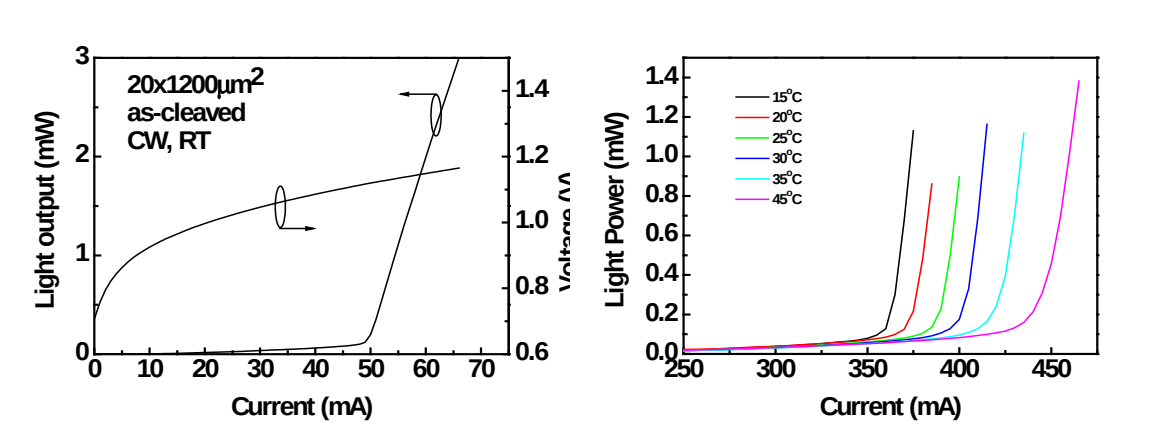
1 μm In(0.02 -- 0.25)GaAs, RMS=1.309 nm,
In源温按照线性变化

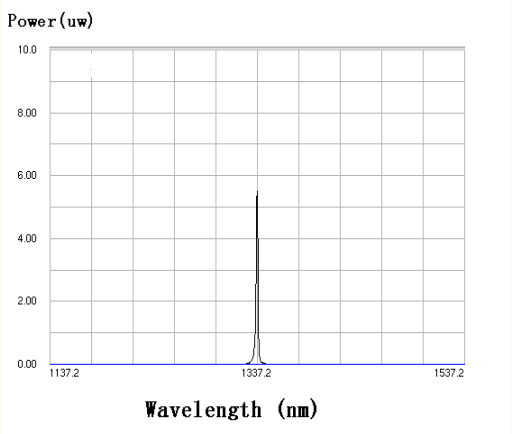


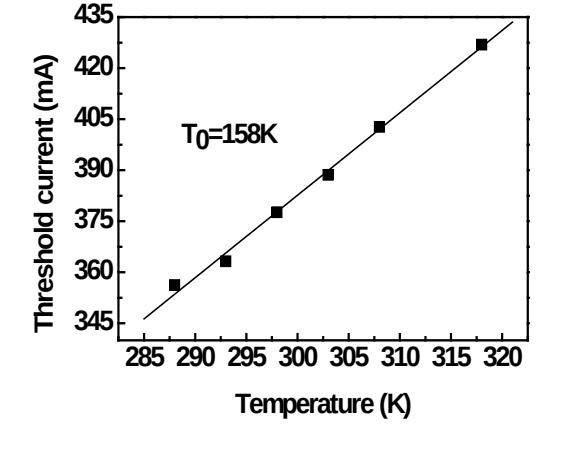
1.3 InGaAs/GaAs ↓ ↓

J_{th}=205A/cm2 158K, : 0.17W/A

p-GaAs 10nm (Be: 1 10^{19} cm^{-3})
p-$In_{0.18}$GaAs 50nm (Be: 1 10^{19} cm^{-3})
p- $In_{0.18}$GaAs 200nm (Be: 5 10^{18} cm^{-3})
p-$In_{0.18}Al_{0.36->0.2}$GaAs 200nm (Be: 2 10^{18} cm^{-3})
p- $In_{0.18}Al_{0.36}$GaAs 750nm (Be: 2 10^{18} cm^{-3})
p- $In_{0.18}Al_{0.36}$GaAs 750nm (Be: 1 10^{18} cm^{-3})
i-$In_{0.18}Al_{0.2->0.36}$GaAs 200nm
i-$In_{0.18}$GaAs 100nm
i-$In_{0.47}$GaAs QW 7nm
i-$In_{0.18}$GaAs 100nm
i-$In_{0.18}Al_{0.36->0.2}$GaAs 200nm
n-$In_{0.18}Al_{0.36}$GaAs 1500nm (Si: 1.4 10^{18} cm^{-3})
n-$In_{0.18}Al_{0.2->0.36}$GaAs 200nm (Si: 1.4 10^{18} cm^{-3})
n-$In_{0.02->0.25}$GaAs 1000nm (Si: 2 10^{18} cm^{-3})
n-GaAs buffer 300nm (Si: 2 $10^{18}cm^{-3}$)
n-GaAs substrate







Electronics Letters,44,474 (2008)

2008 4 IOP Compound Semiconductor

InGaAs laser breaks into telecom territory!

TECHNOLOGY RESEARCH REVIEW

PHOTOVOLTAICS

Electroluminescence exposes subcells

German researchers have developed the first technique that measures the electrical characteristics of the three solar cells that make up triple-junction devices deployed in satellites and concentrator photovoltaics.

The technique promises to improve conver-

recombination current. "It constitutes an upper limit for efficiency and open-circuit voltage if radiative recombination is the dominant recombination process," said Thomas Kirchartz from the photovoltaics department at the Research Center, Jülich, Germany.

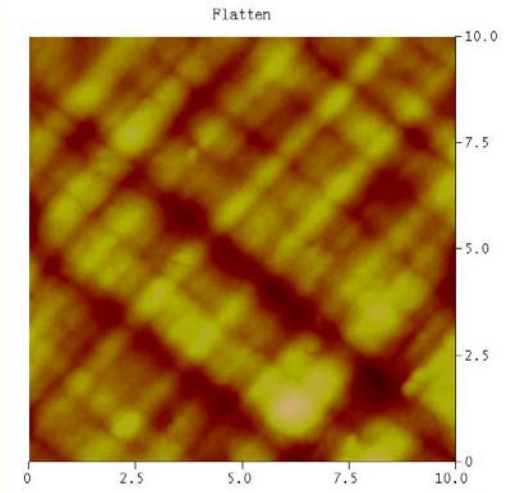
and 1–2 hours to determine the internal voltage at several injection currents. "Data interpretation is done automatically with a Matlab script in a short time," said Kirchartz.

Future work at Jülich

focusing on improving

1.55 InGaAs/GaAs ↓

RMS 2.840nm



In ↑ 50%

InGaAs ↓

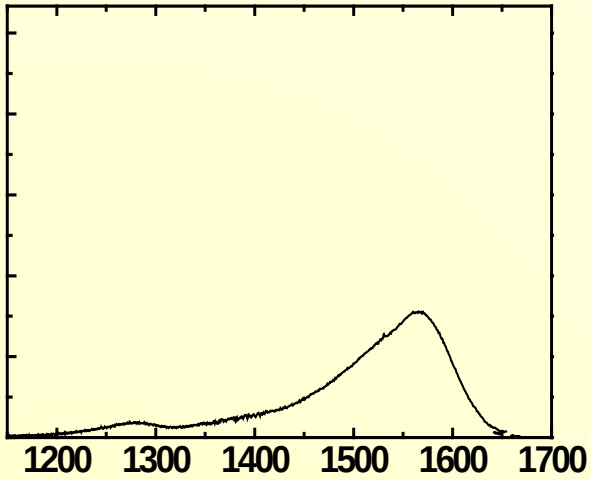
…

1

2 GaAs

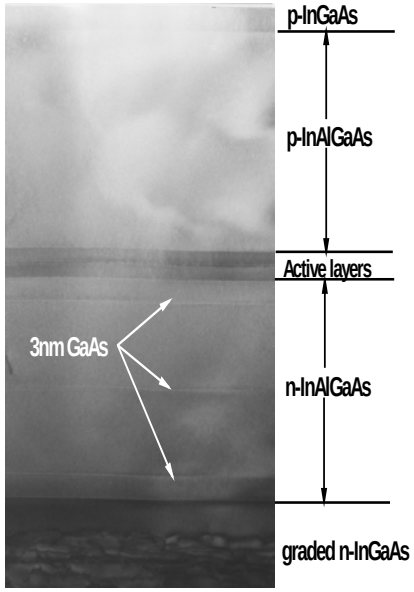
3 Sb ↓ ↓

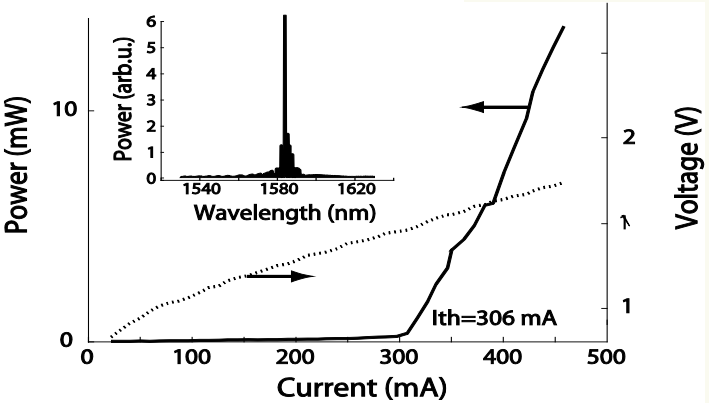
4 ↓



1.55 InGaAs/GaAs

p-GaAs 10nm (Be: 1 $^{-3}$)
p-$In_{0.32}$GaAs (Sb:5E-9Torr) 50nm (Be: 1 $^{-3}$)
p- $In_{0.32}$GaAs (Sb:5E-9Torr) 200nm (Be: 5 $^{-3}$)
p-$In_{0.32}Al_{0.32->0.216}$GaAs (Sb:5E-9Torr) 200nm (Be: 2 $^{-3}$)
p- $In_{0.32}Al_{0.32}$GaAs (Sb:5E-9Torr) 750nm (Be: 2 $^{-3}$)
p- $In_{0.32}Al_{0.32}$GaAs (Sb:5E-9Torr) 750nm (Be: 5 $^{-3}$)
i-$In_{0.32}Al_{0.216->0.32}$GaAs (Sb:5E-9Torr) 200nm
i-GaAs 3nm
i-$In_{0.32}$GaAs (Sb:5E-9Torr) 100nm
i-$In_{0.6}$GaAs QW (Sb:5E-9Torr) 7nm
i-$In_{0.32}$GaAs (Sb:5E-9Torr) 130nm
i-GaAs 3nm
i-$In_{0.32}Al_{0.32->0.216}$GaAs (Sb:5E-9Torr) 200nm
n-GaAs 3nm
n-$In_{0.32}Al_{0.32}$GaAs (Sb:5E-9Torr) 750nm (Si: 4 $^{-3}$)
n-GaAs 3nm
n-$In_{0.32}Al_{0.32}$GaAs (Sb:5E-9Torr) 750nm (Si: 2 $^{-3}$)
n-GaAs 3nm
n-$In_{0.32}Al_{0.216->0.32}$GaAs (Sb:5E-9Torr) 200nm (Si: 2 $^{-3}$)
n-GaAs 3nm
n-$In_{0.02->0.39}$GaAs 1500nm (Si: 2 $^{-3}$)
n-GaAs buffer 300nm (Si: 2 $^{-3}$)
n-GaAs substrate





2008 1

Laser Focus World

InGaAs QWs lasers provide alternative to 1.55 um GaAs based lasers

news breaks

InGaAs quantum-well lasers provide alternative to 1.55 µm GaAs-based lasers

Gallium arsenide (GaAs) lasers at 1.3 and 1.55 µm have received a lot of attention in the past several years for their potential as inexpensive, high-speed, uncooled sources for telecommunications. With careful optimization of metamorphic crystal growth, structure, and optical properties, researchers at Chalmers University of Technology (Gothenburg, Sweden) and the Chinese Academy of Sciences (Beijing, China) have demonstrated metamorphic 1.58 µm indium gallium arsenide (InGaAs) quantum-well lasers that may be a promising alternative to 1.55 µm GaAs-based lasers.

The metamorphic InGaAs quantum-well laser was grown by molecular beam epitaxy on an *n*-type GaAs substrate using a low growth temperature of 440°C and

Retinal flow cytometer tracks circulating blood cells

A retinal flow cytometer developed by researchers from the Wellman Center for Photomedicine at Massachusetts General Hospital and Harvard Medical School (Cambridge, MA) has demonstrated the potential to noninvasively monitor disease progression and enhance treatment by measuring blood flow in the eyes. The *in vivo* instrument is capable of continuous, real-time monitoring of fluorescently labeled blood cells as they circulate in retinal tissue at the back of the eye, eliminating the need to draw blood samples.

The cytometer improves cell-detection sensitivity by increasing sampling volume. Two phase-locked resonant galvanometer scanners steer the 635 nm beam at a rate of 4.5 kHz, creating a circular scan on the retina. Fluorescence is descanned by the resonant scanning mirrors and detected through a dichroic long-pass filter at 45° and through a 670 nm bandpass filter. A confocal pinhole in front of the photomultiplier tub

GaAs

1 HEMT

2 Sb

3

4 GaInNAs

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22nmЛЪЮSi

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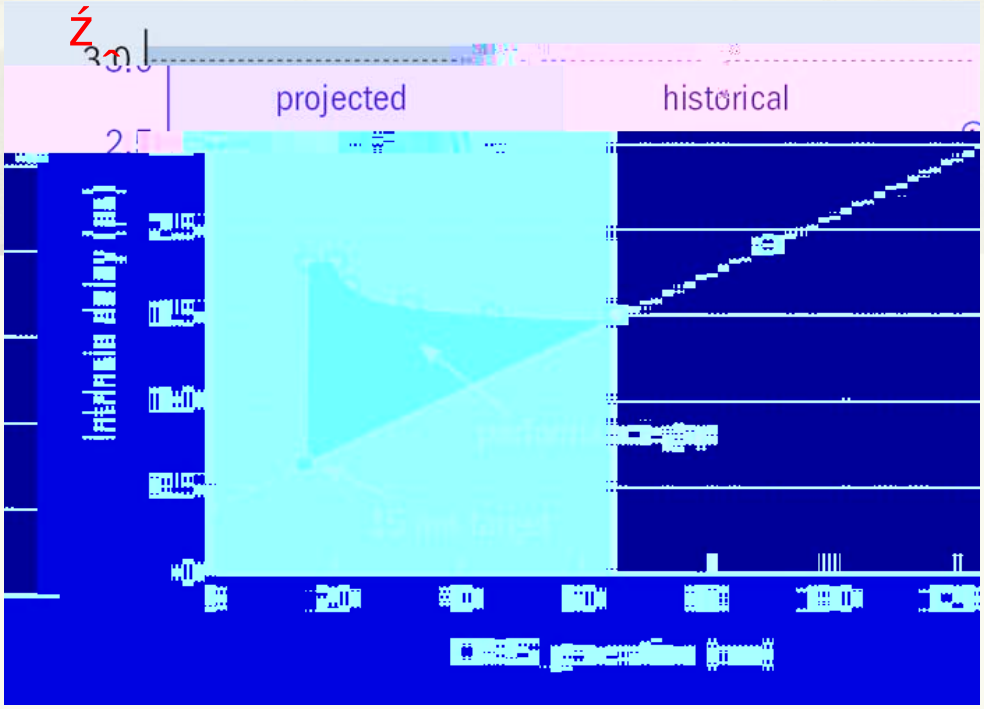

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Si/Ge/III–V +

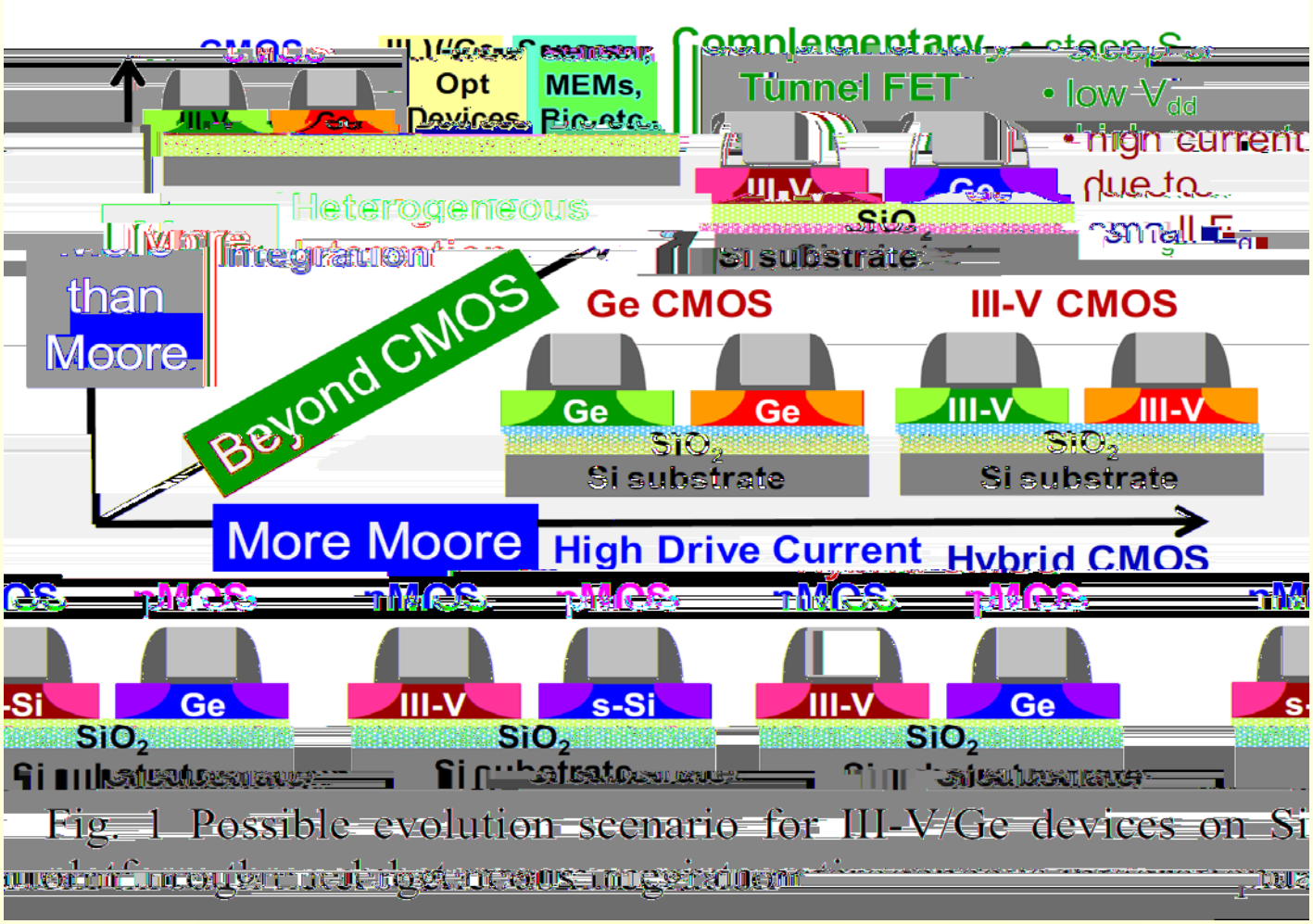
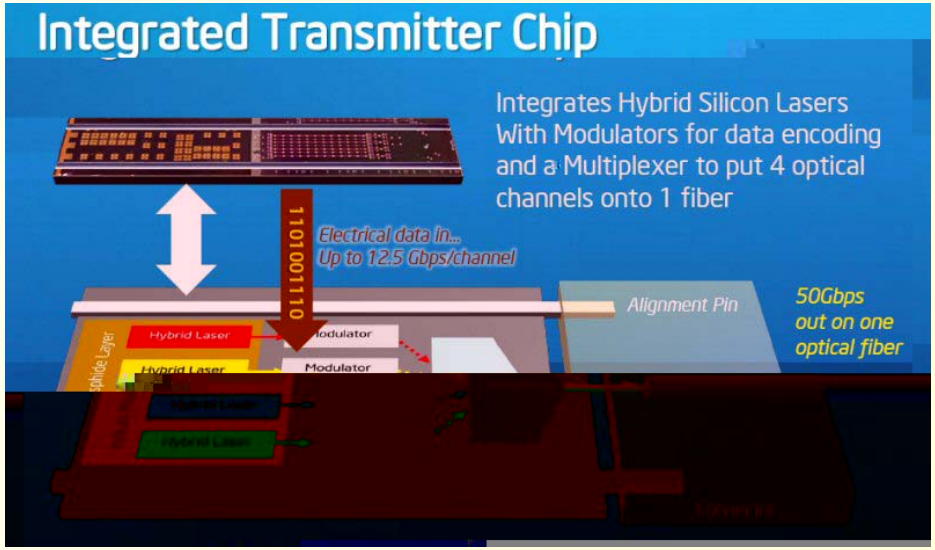
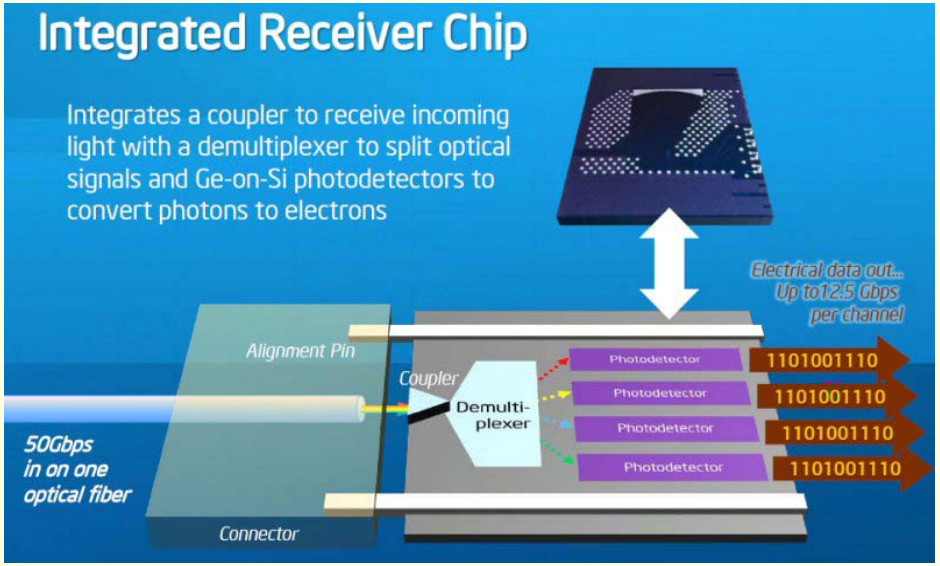
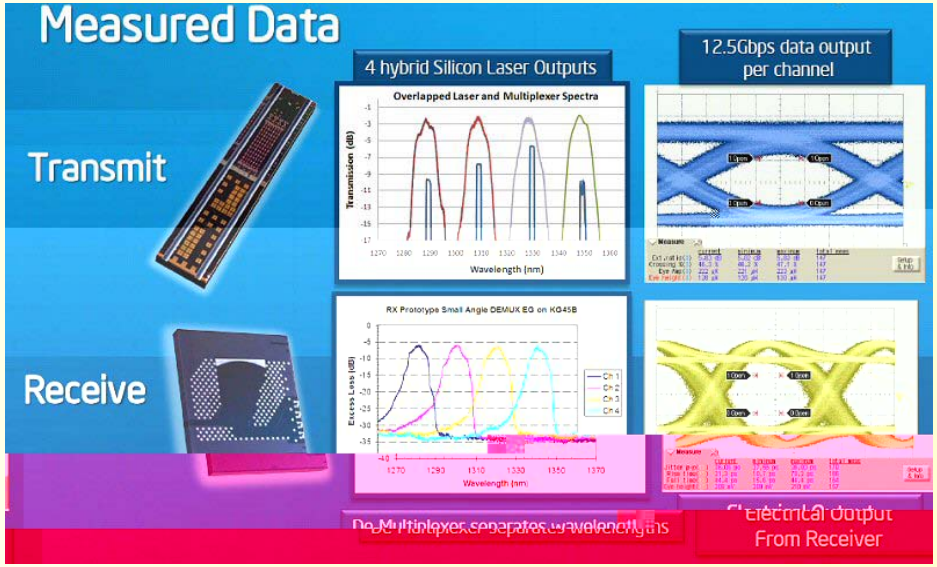


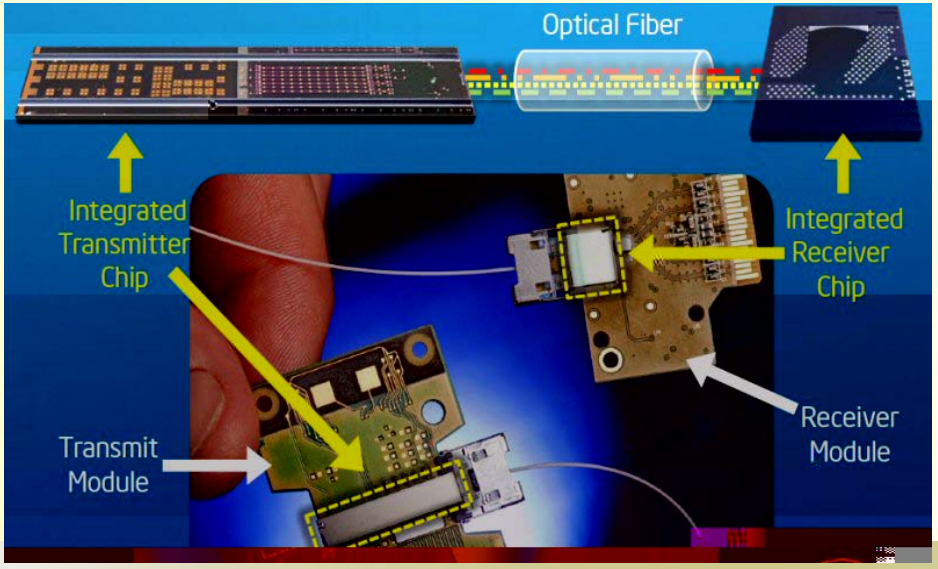
Fig. 1 Possible evolution scenario for III-V/Ge devices on Si

Intel


Integrated Transmitter Chip
Integrates Hybrid Silicon Lasers With Modulators for data encoding and a Multiplexer to put 4 optical channels onto 1 fiber
1101001110
Electrical data in... Up to 12.5 Gbps/channel
Alignment Pin
50Gbps out on one optical fiber
Hybrid Laser
Modulator


Integrated Receiver Chip
Integrates a coupler to receive incoming light with a demultiplexer to split optical signals and Ge-on-Si photodetectors to convert photons to electrons
Electrical data out... Up to12.5 Gbps per channel
Alignment Pin
Coupler
Demulti-plexer
Photodetector
1101001110
50Gbps in on one optical fiber
Connector


Measured Data
Transmit
Receive
4 hybrid Silicon Laser Outputs
Overlapped Laser and Multiplexer Spectra
Transmission (dB)
Wavelength (nm)
12.5Gbps data output per channel
RX Prototype Small Angle DEMUX EQ on KG45B
Excess Loss (dB)
Wavelength (nm)
Electrical Output From Receiver


Optical Fiber
Integrated Transmitter Chip
Integrated Receiver Chip
Transmit Module
Receiver Module

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2 ʒSi?

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2 Ю ʒ Sb ɣ

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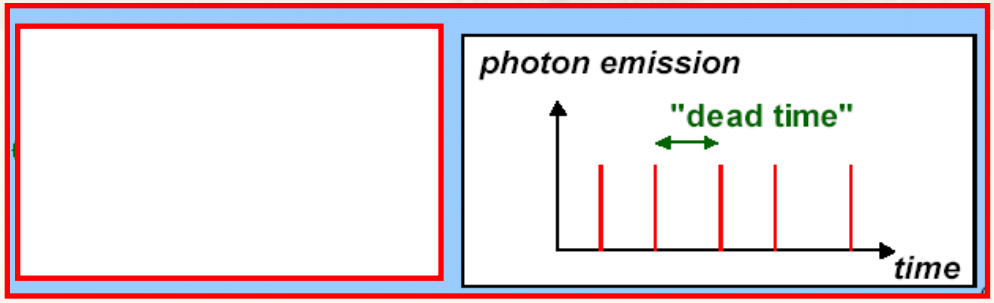
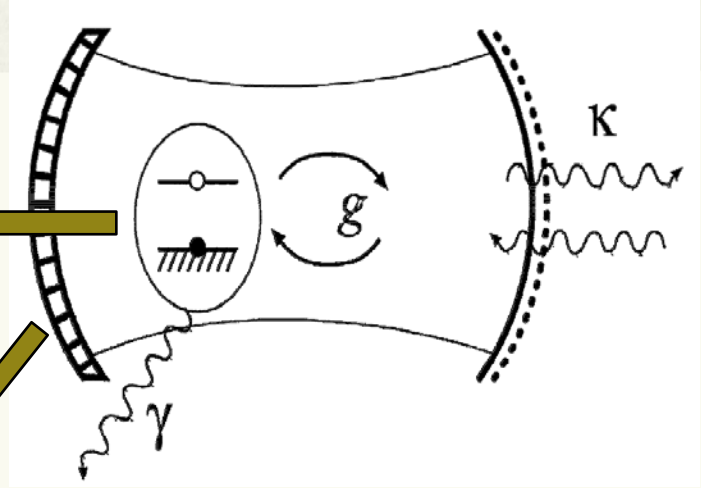
2 = ⌟

$$\hat{H}_s = \underbrace{\frac{\hbar\omega_A}{2}\hat{\sigma}_z}_{} + \underbrace{\hbar\omega_C \hat{b}^+\hat{b}}_{} + \underbrace{i\hbar[g(r)\hat{b}^+\hat{\sigma}_- - g^*(r)\hat{b}\hat{\sigma}_+]}_{}$$





利用腔与原子的耦合效应，实现微腔对原子自发辐射调控，产生相干、单光子/纠缠光子。

γ→ Ч

K→

g → б Ч Л

$$g = \frac{\mu}{\hbar}\sqrt{\frac{\hbar\omega}{2\varepsilon_0 V}}$$

- **Purcell**

  β ≈

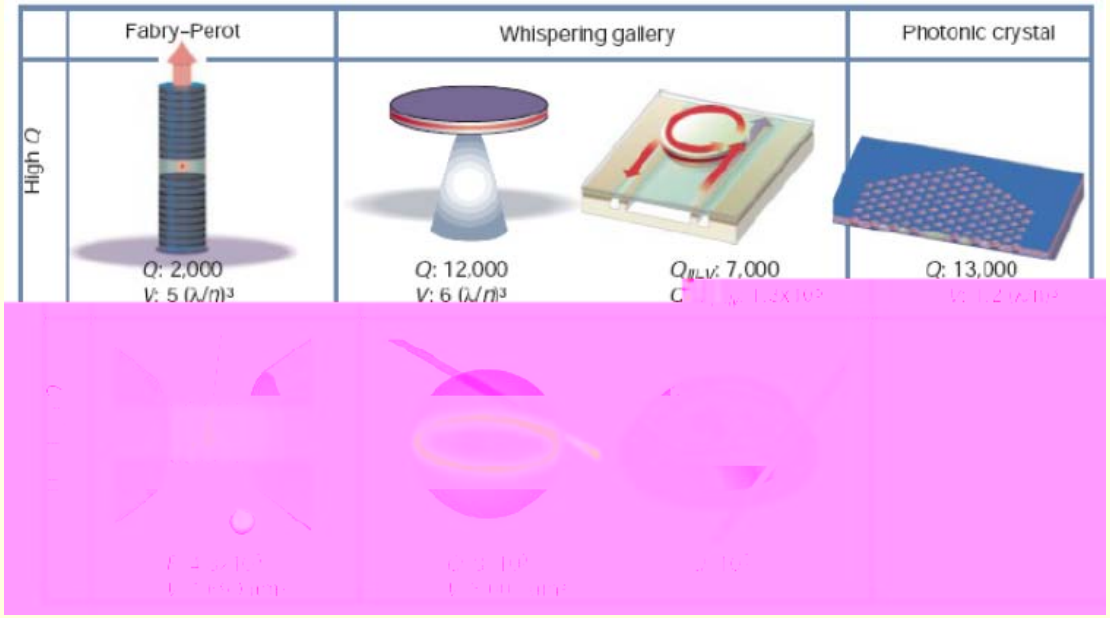
$$\beta = \frac{F_p}{1+F_p} \qquad F_p = \frac{3\lambda^3}{4\pi^2}\frac{Q}{V}$$

- *T* *Q*

- **spectral filtering**

  Q

Λ

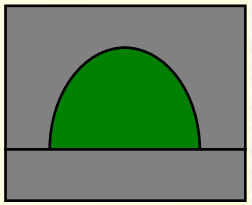


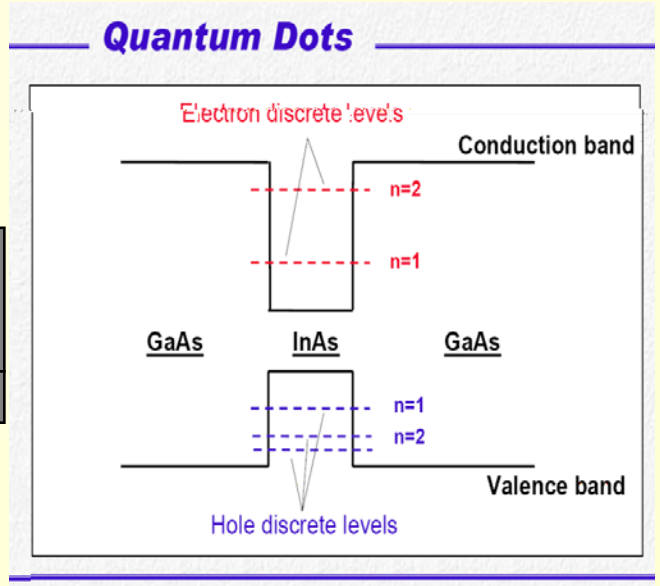
p Q $$Q = \frac{W_{cav}}{P_{loss} / \omega} \qquad Q = \frac{\omega_0}{\Delta\omega}$$

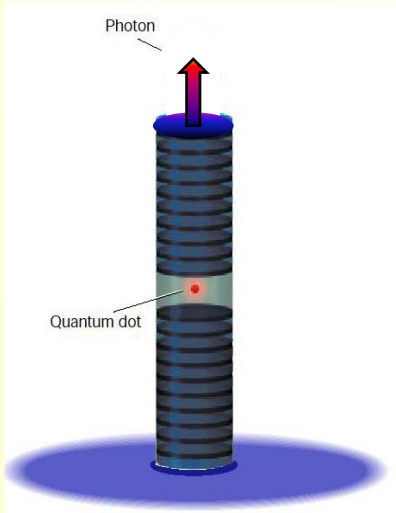
V $$V_{eff} = \frac{\int \varepsilon(\boldsymbol{r}) \boldsymbol{E}^2(\boldsymbol{r}) dV}{\left(\varepsilon(\boldsymbol{r}) \boldsymbol{E}^2(\boldsymbol{r})\right)_{\max}}$$

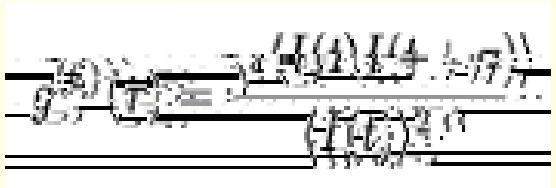
Λ g $$g = \frac{\mu}{\hbar}\sqrt{\frac{\hbar\omega}{2\varepsilon_0 V}} \qquad \gamma_0 = \omega^3\mu^2 \big/ 3\pi\varepsilon_0\hbar c^3 \qquad \gamma_{cav} = \omega \big/ 2Q$$

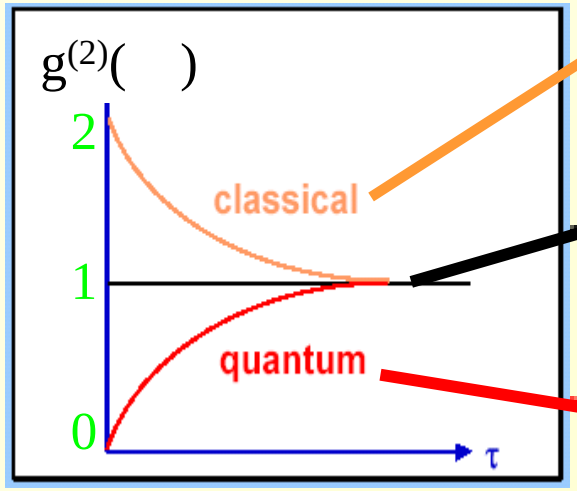
Λ $$g > \gamma_{cav}, \gamma_0$$ Λ $$g < \gamma_{cav}, \gamma_0$$




Quantum Dots
Electron discrete levels
Conduction band
n=2
n=1
GaAs
InAs
GaAs
n=1
n=2
Valence band
Hole discrete levels


Photon
Quantum dot

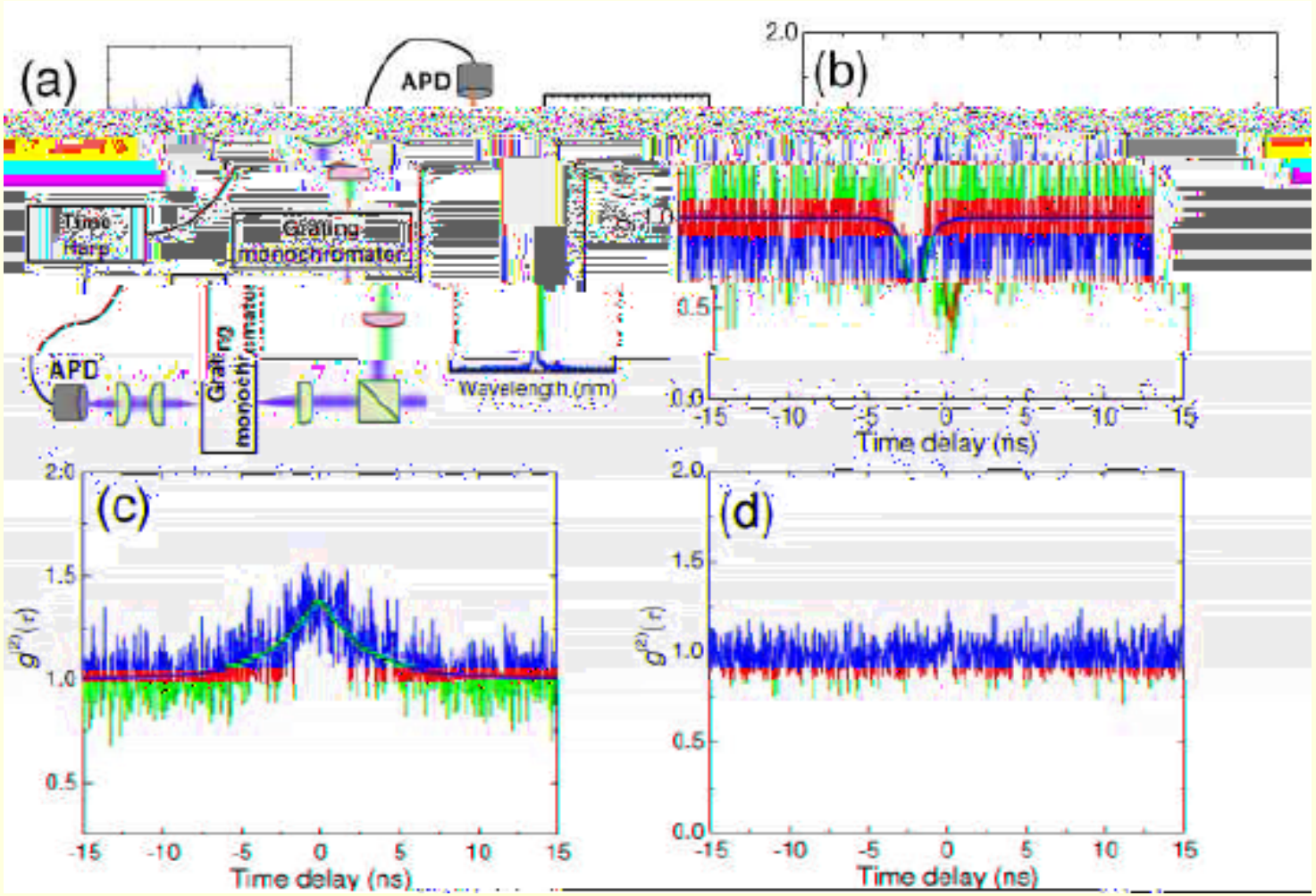




(photon bunching)

Anti bunching

Hanbury Brown Twiss HBT $g^{(2)}$



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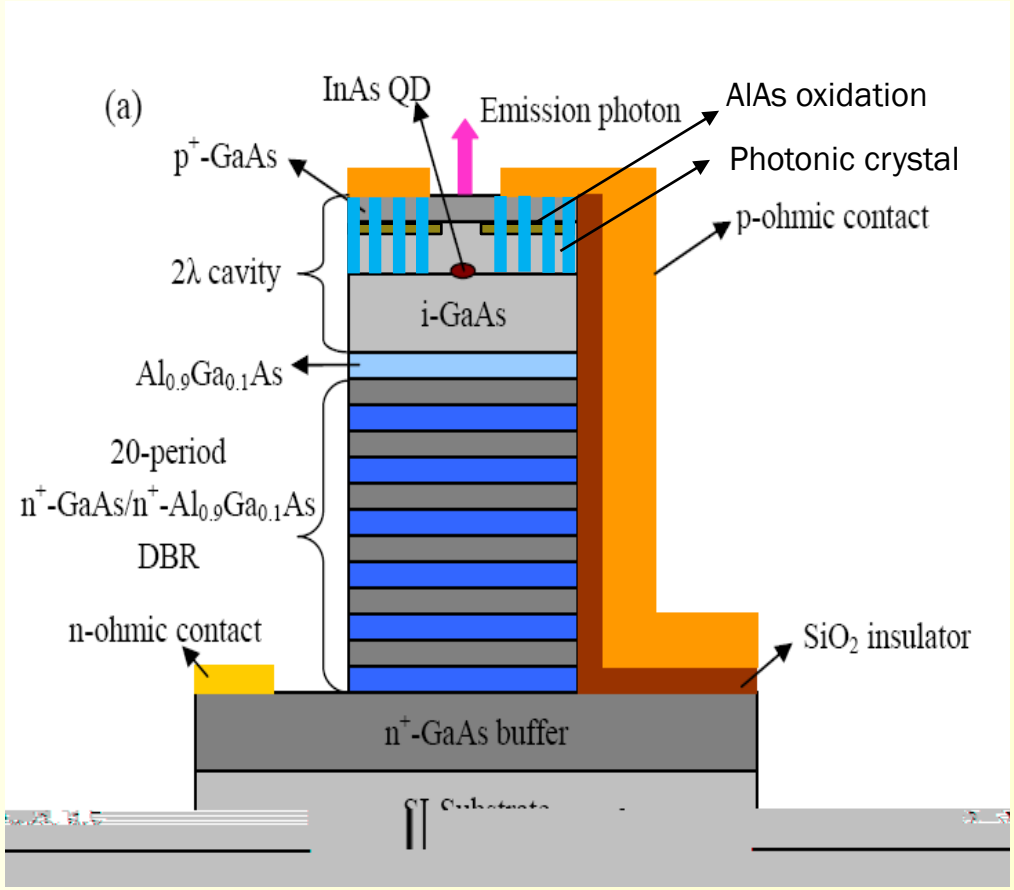
(a)
InAs QD
Emission photon
AlAs oxidation
Photonic crystal
p-ohmic contact
p+-GaAs
2λ cavity
i-GaAs
Al0.9Ga0.1As
20-period
n+-GaAs/n+-Al0.9Ga0.1As
DBR
n-ohmic contact
SiO2 insulator
n+-GaAs buffer

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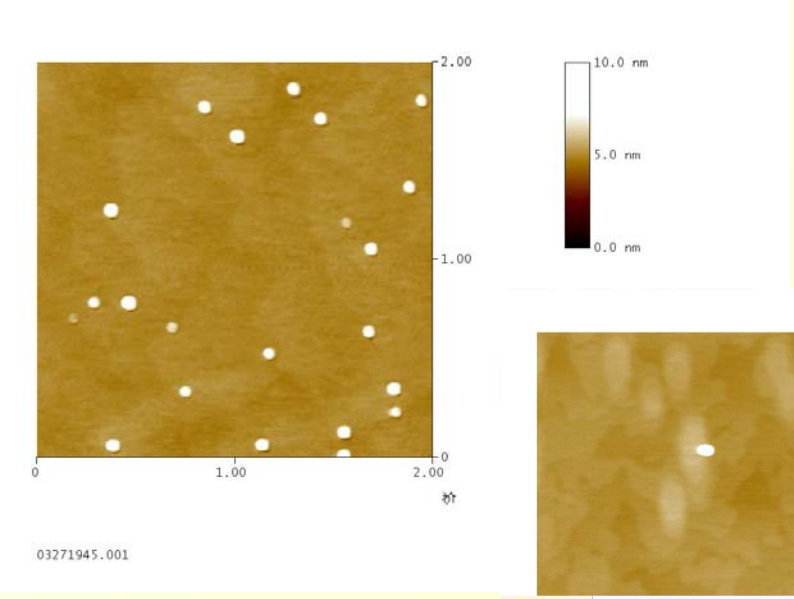
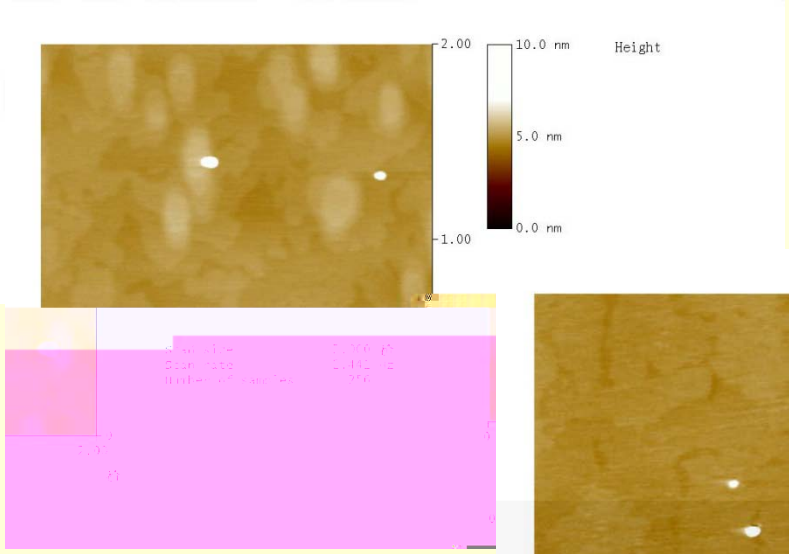
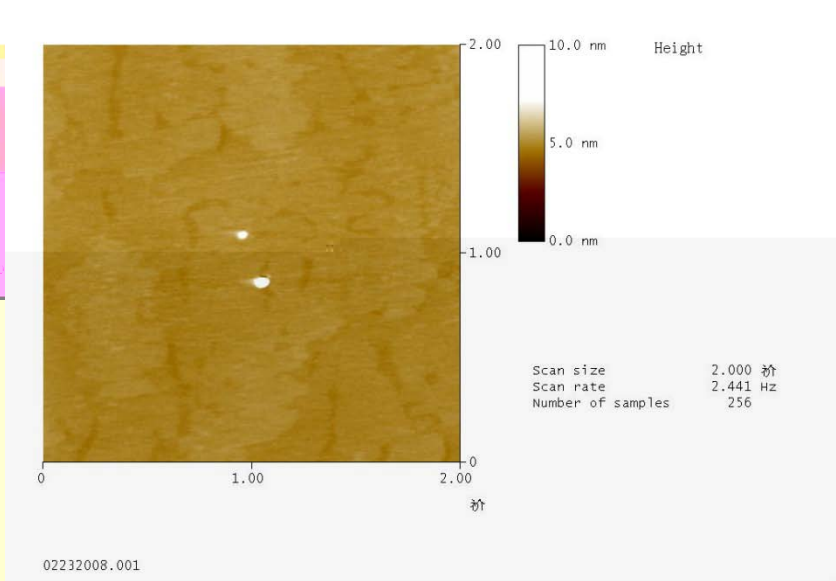
1.
2.
3.

InAs


2.00
1.00
0
0
1.00
2.00
µm
10.0 nm
5.0 nm
0.0 nm
03271945.001


2.00
1.00
10.0 nm
5.0 nm
0.0 nm
Height


2.00
1.00
0
0
1.00
2.00
µm
10.0 nm
5.0 nm
0.0 nm
Height
Scan size 2.000 µm
Scan rate 2.441 Hz
Number of samples 256
02232008.001

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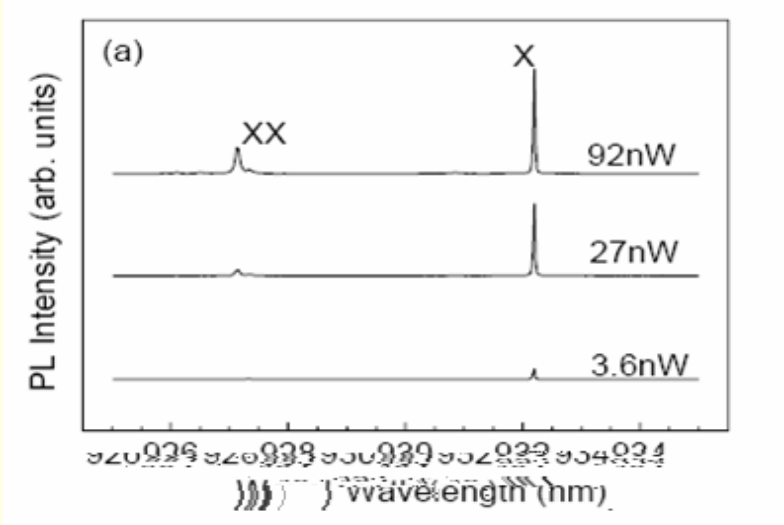

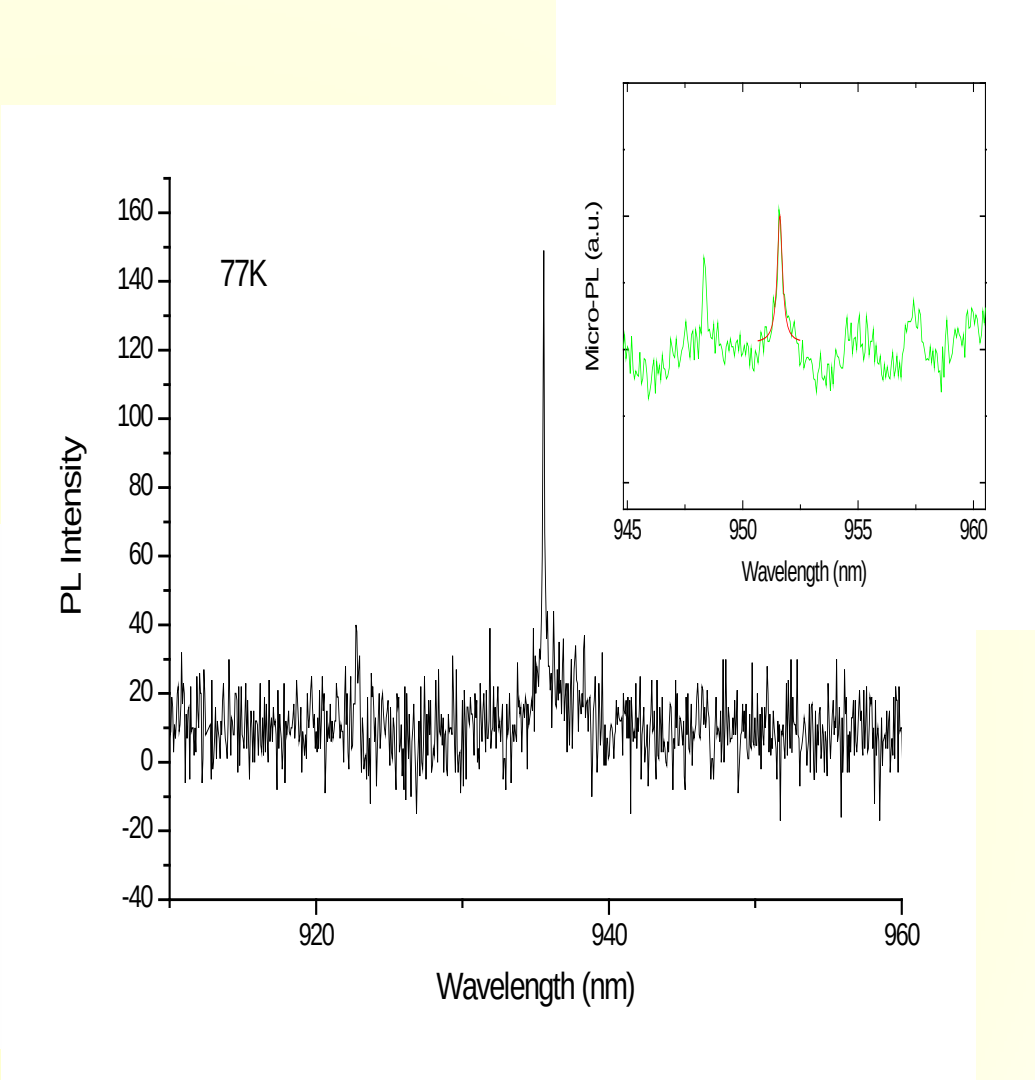

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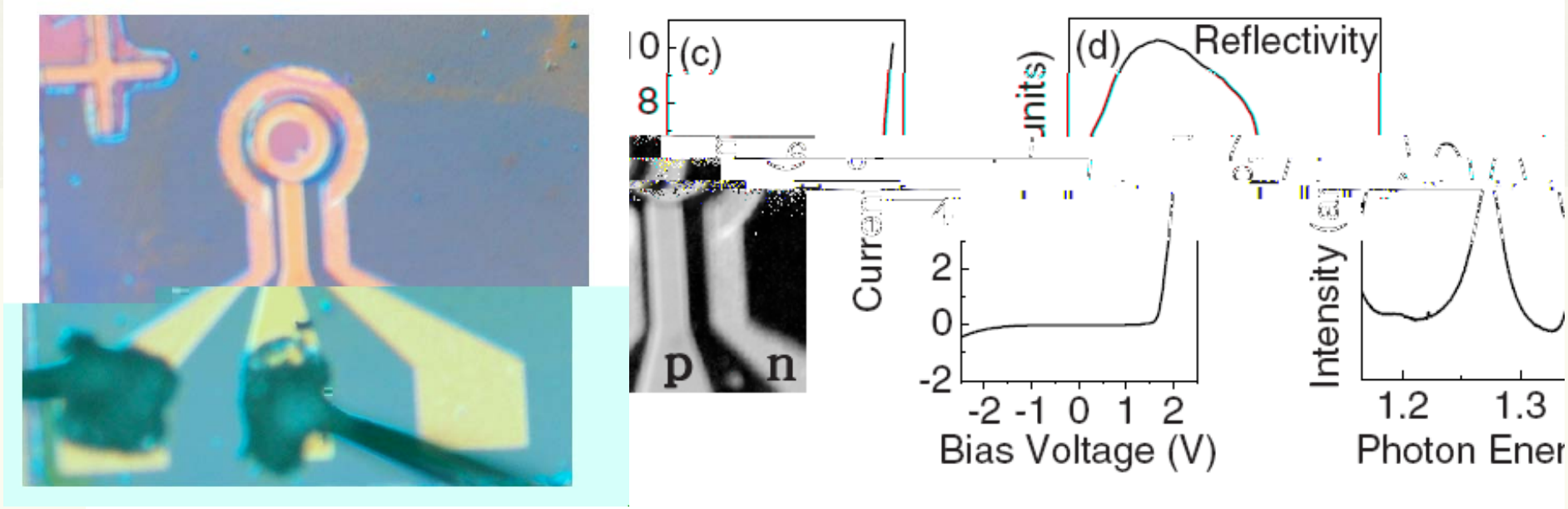
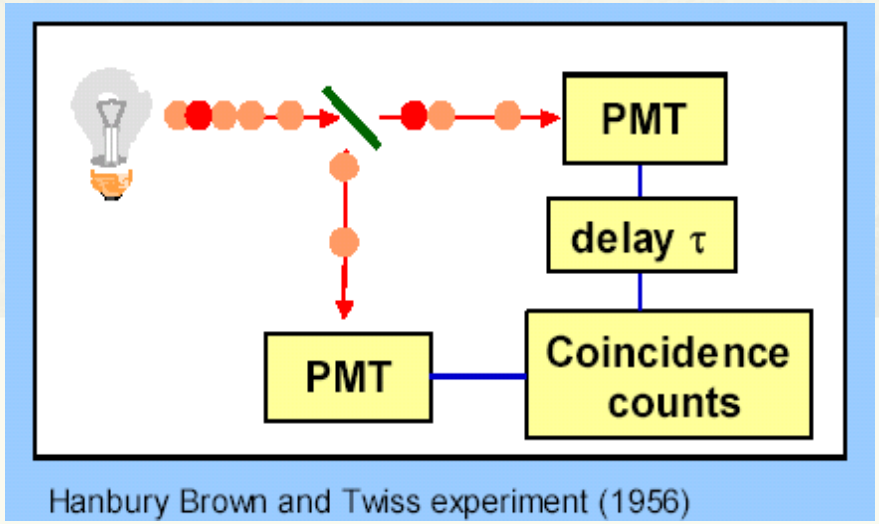
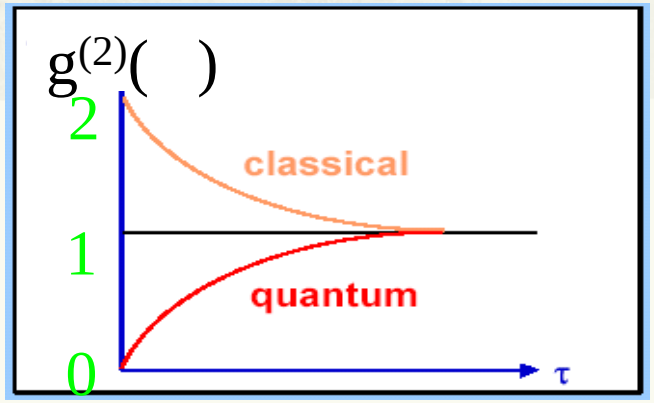


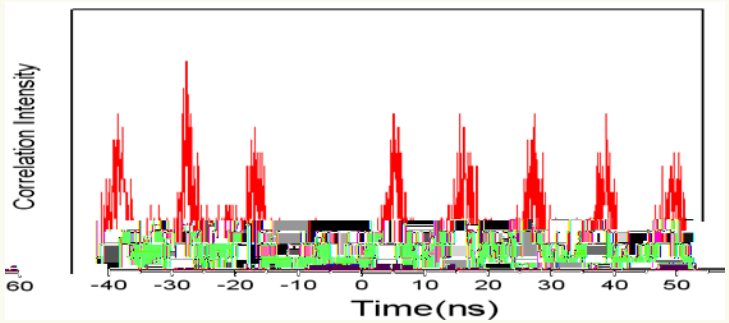
Reflectivity of the planer cavity and the PL of QD ensemble in the samp

´ ↳ HBT


PMT
delay τ
PMT
Coincidence counts
Hanbury Brown and Twiss experiment (1956)


g(2)( )
2
1
0
classical
quantum
τ

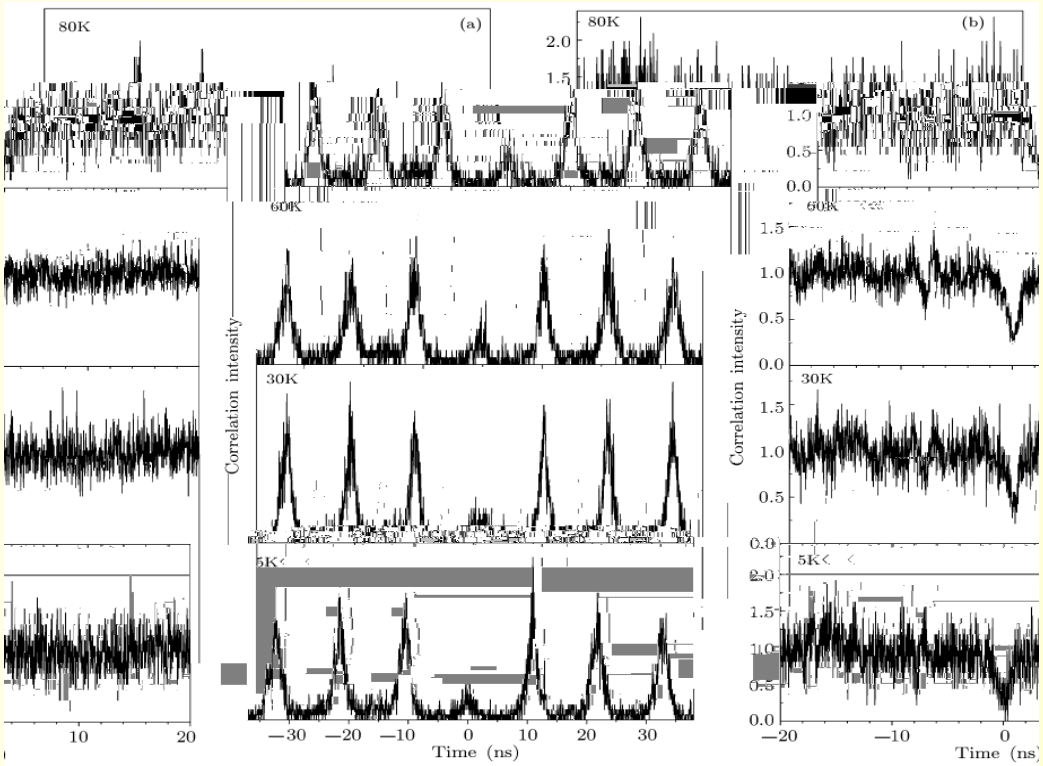
HBT
G

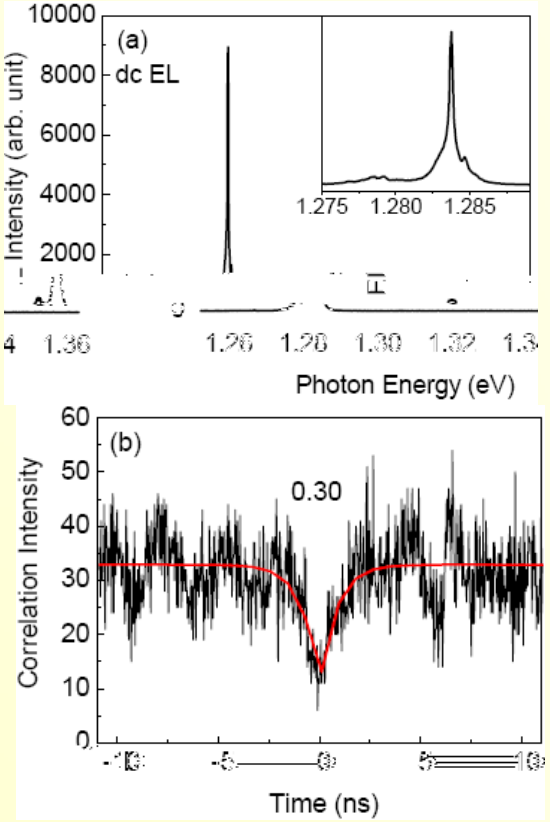

Correlation Intensity
60
-40
-30
-20
-10
0
10
20
30
40
50
Time(ns)

77K HBT

HBT - ´ ϟ

5-80K ϟ 77K ϟ





Ь $g^{(2)}$ HBT ; a

APD Ω ϟ . b

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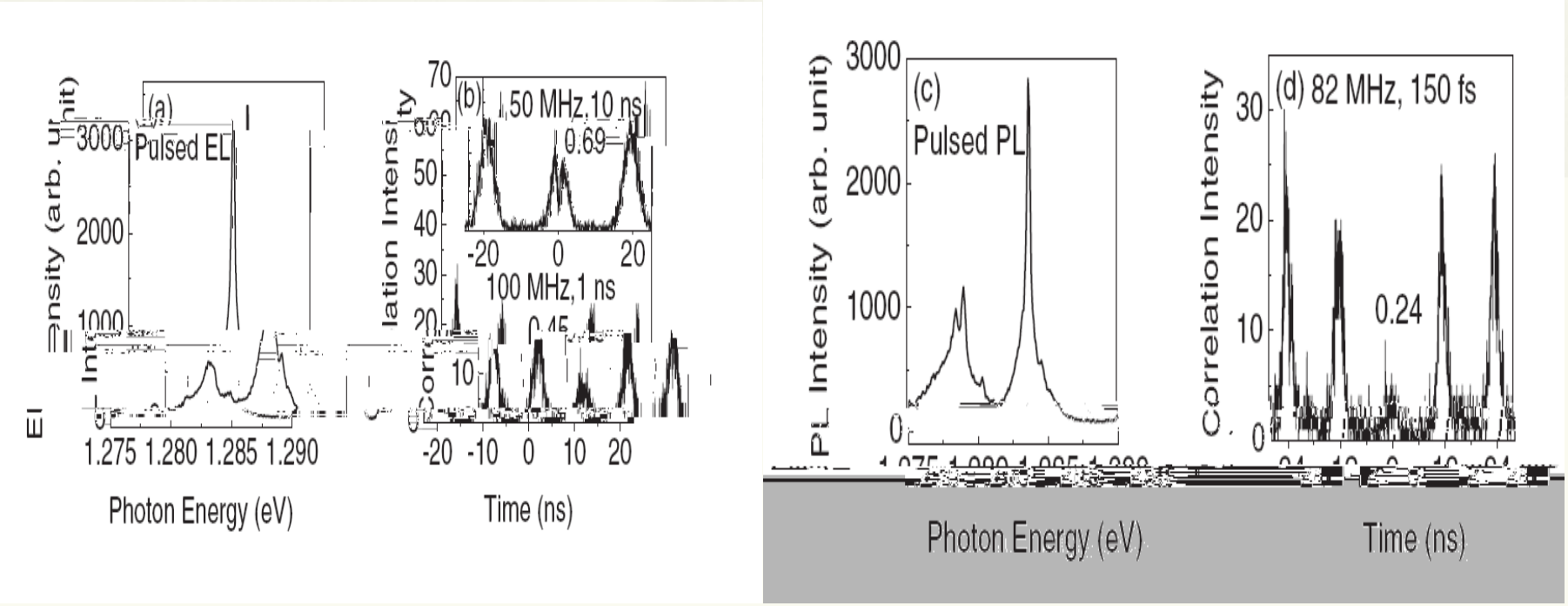
Appl. Phys. Lett. 93, 101107(2008)



(a) EL ă 1 ns.
(b) ă EL(1ns) 2
(c) PL (150 fs
(d) ă PL 2

[illegible]

第一部分研究内容及进展情况报告

[illegible]

[illegible]

[illegible]

[illegible]AS量子点耦合结构，建立了微腔反射率光谱长原位检测和调整技术方法，实现了量子点发光波长的快速热退火调整，通过量子点和微腔光学模式的耦合，大幅度提高了单量子点的发光效率。

3．建立了激光非线性晶体参数下转换双光子纠缠态的关联性特性测试、纠缠光子杨氏干涉等HBT测试实验系统，建立了低温微区和时间分辨光谱测试系统，解决了单光子识别测试技术难题。

4．自主设计制备了电驱动微腔单量子点耦合单光子发射器件，实现了液氦温度下电驱动InAs量子点以及单光子发射，其中单

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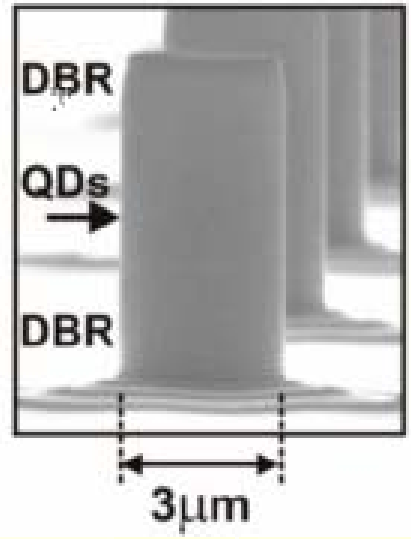

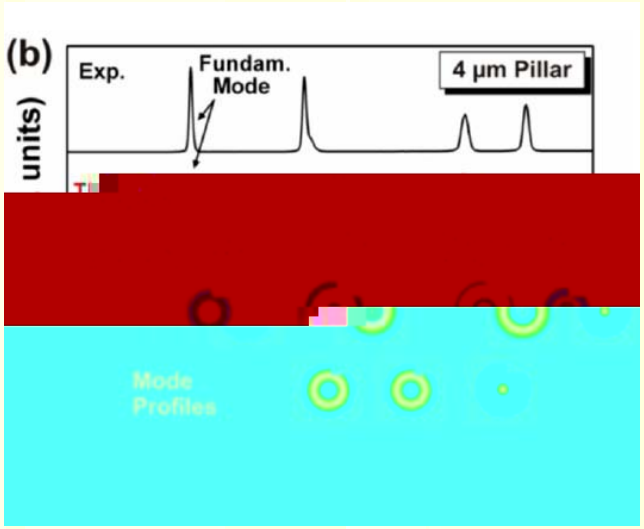

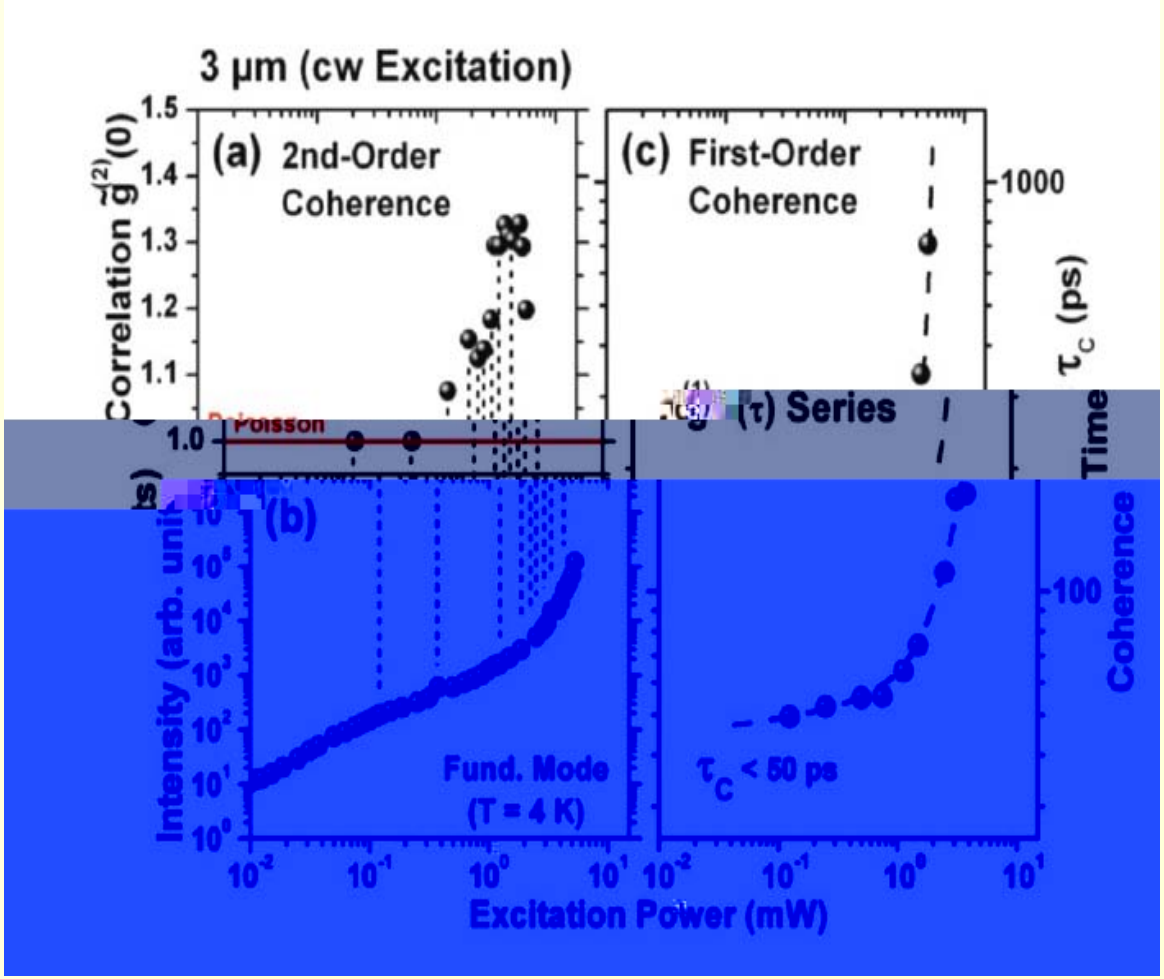

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