

**ISO 9001, TL 9000, ISO 14001 & OHSAS 18001 Certified**



# **Innovative and Cost Effective Components for Optical Networks**

**Wen Liu (Chang Jiang Professor)**

**(Deputy CTO of Fiberhome Technologies)**

**July 14, 2009**

# Outline

- Brief introduction of Fiberhome (WRI) OC
- Technologies and Products
- A Few Examples of Innovative Design
- Summary

# WRI Group (FiberHome Group) Structure

## **FiberHome Telecommunication Technology Co.,Ltd.**

*Optical communication equipments, optical fiber & cable and copper cable*

## **FiberHome Networks Technologies Co.,Ltd.**

*Metro transmission products*

## **Wuhan Hongxin Telecommunication Technologies Co.,Ltd.**

*Wireless products*

## **Accelink Technologies Inc.**

*Optical passive components, Amplifier, Modules and Subsystems*

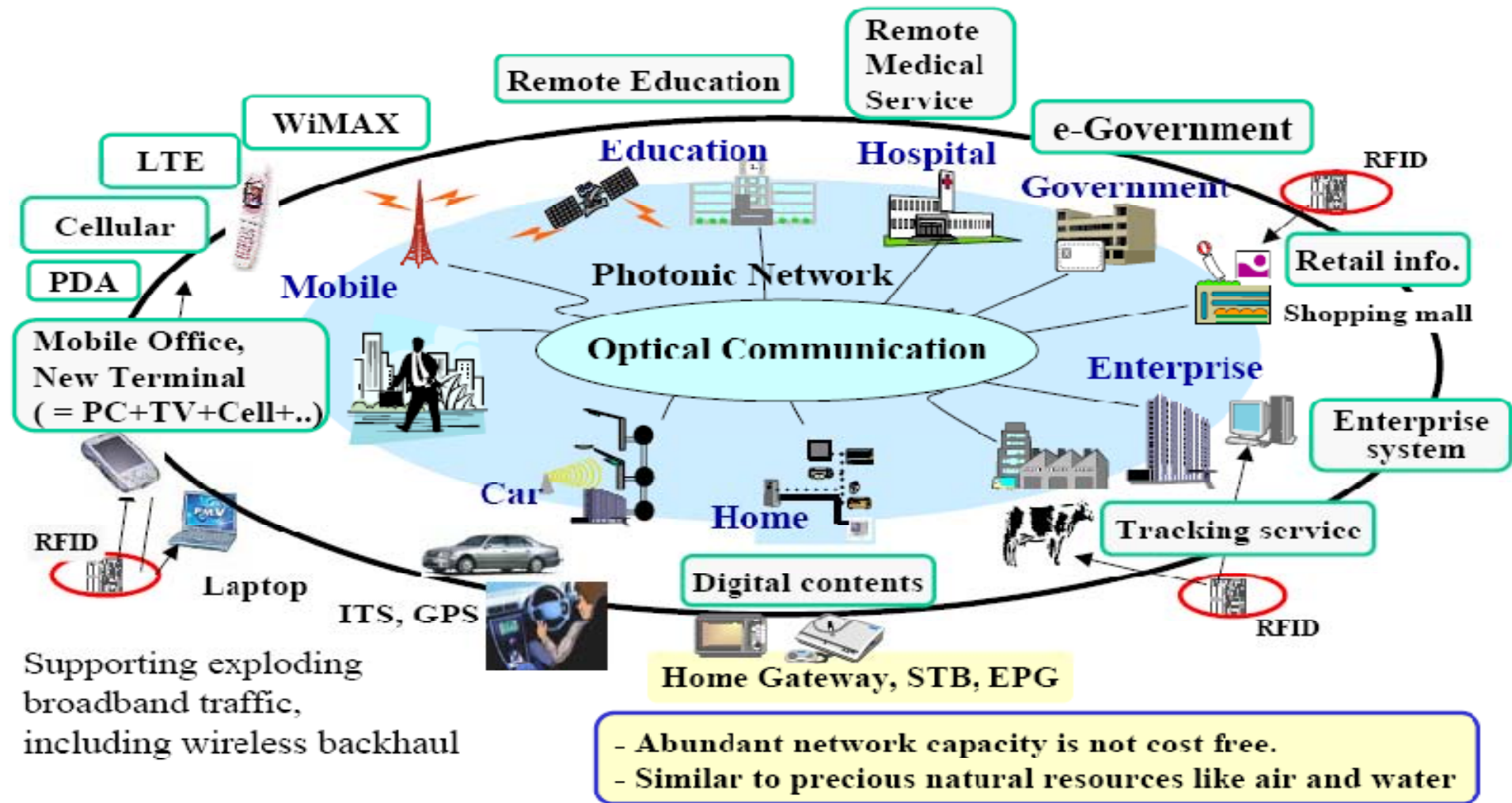
## **Wuhan Telecommunication Devices**

*Semi-conductor opto-electronic devices (active devices)*

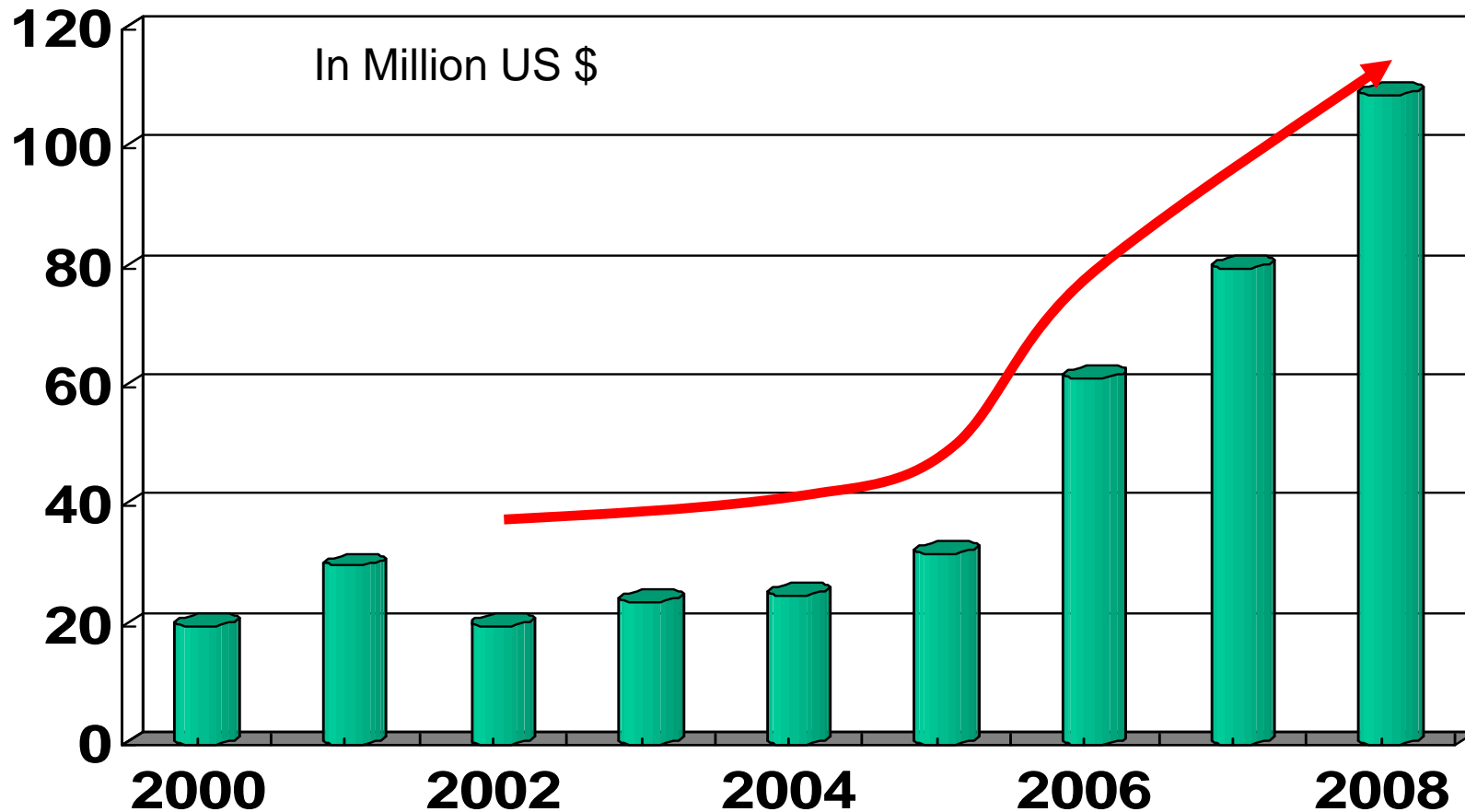
## **US Meiguang Company** *(subsidiary, USA)*

## **Other Subsidiaries**

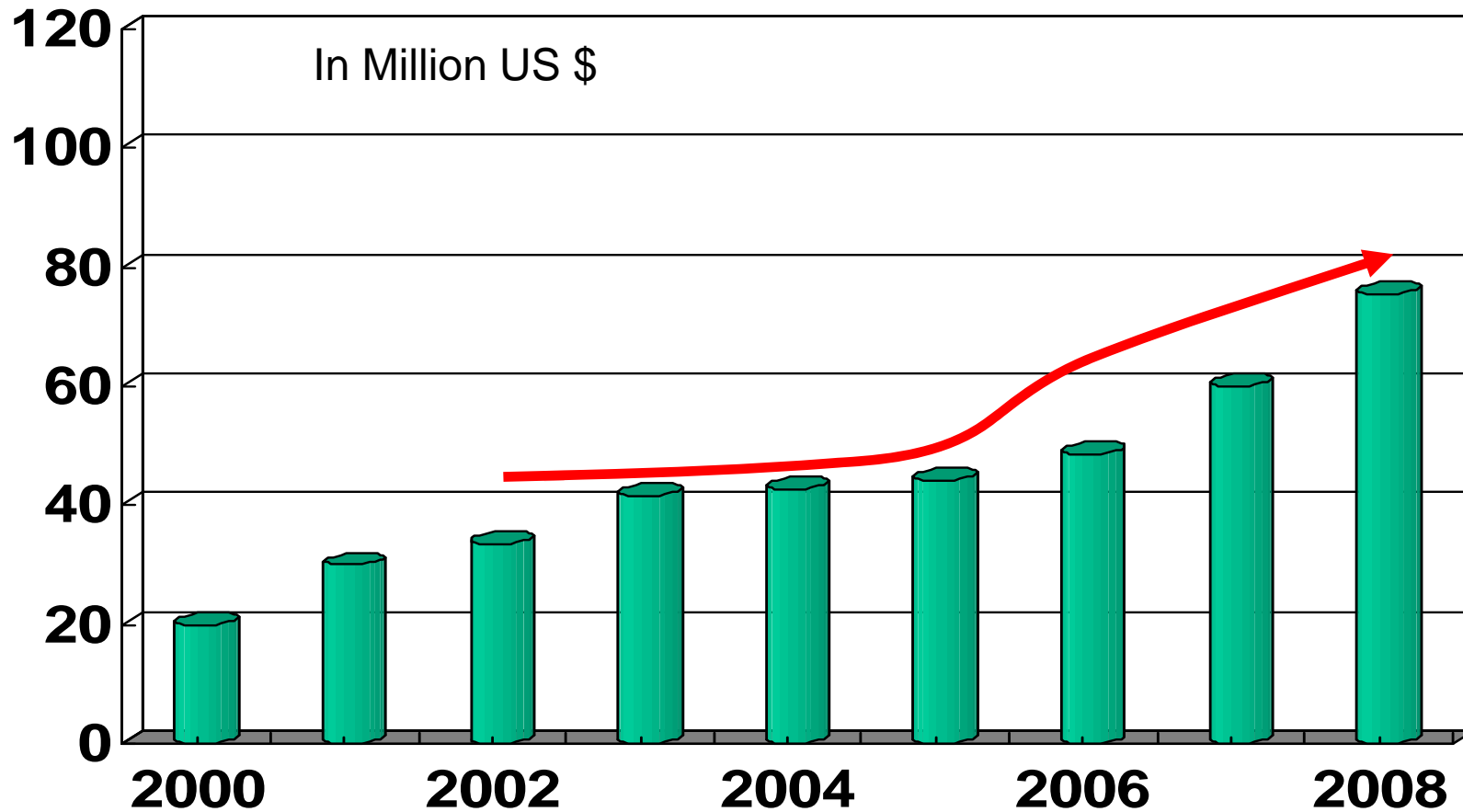
# Fiber network is a key communication infrastructure



# Revenue Chart of Accelink Technologies



# Revenue Chart of WTD

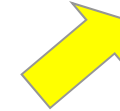


# Management System

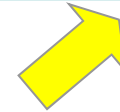
ISO9001, TL9000, ISO14001, OHSAS18001 Certified.



TL 9000  
Certified in Apr. 2005

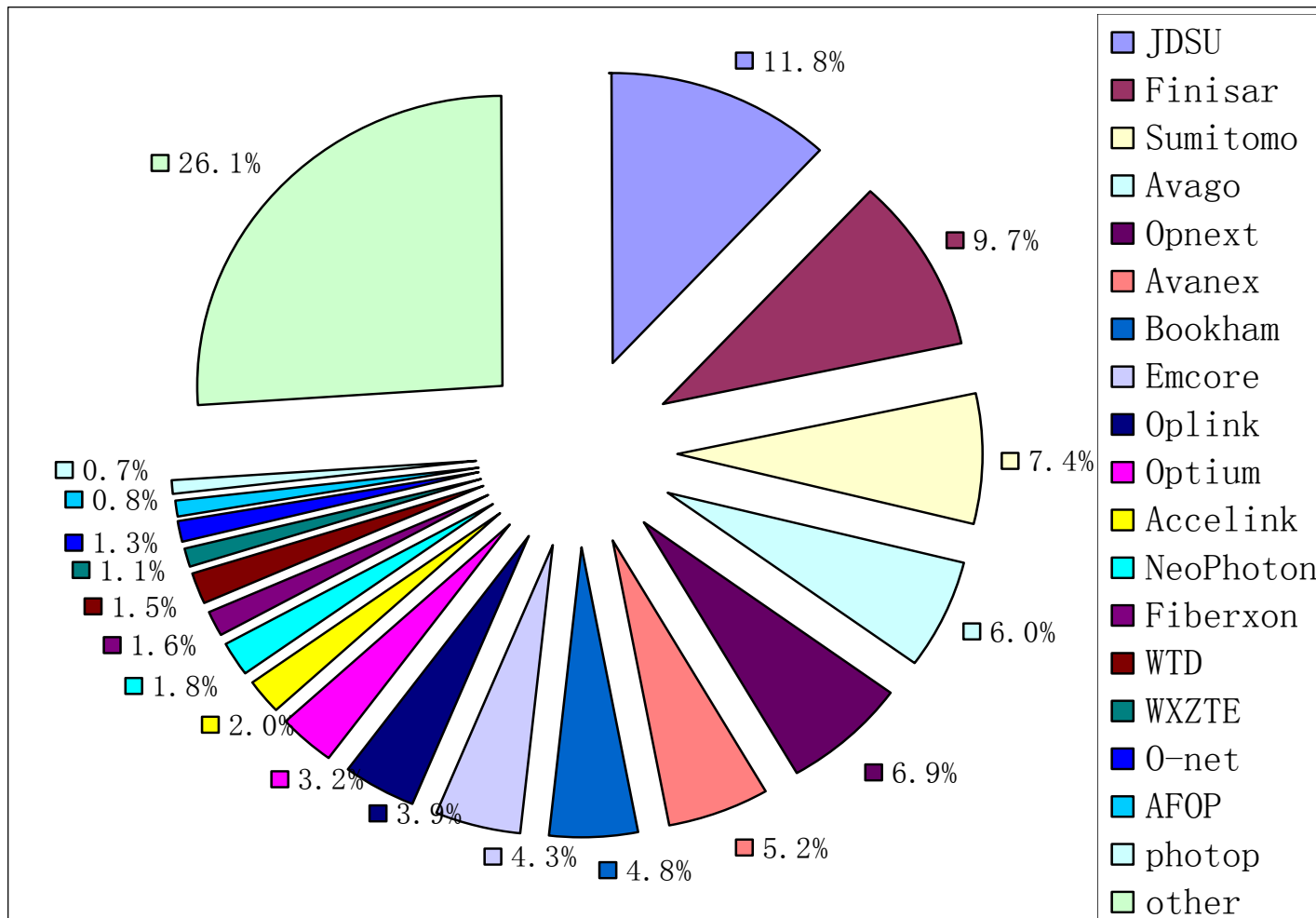


ISO 9001: 2000  
upgraded in the end of 2001



ISO 9001: 1994 Certified  
in Jan. 1999

# Accelink is the Top 10, WTD is the Top 13 in Global OC Companies Industry in 2008



Data: ICCSZ global OC market report 2008



# ENVIRONMENT



# *Facilities*

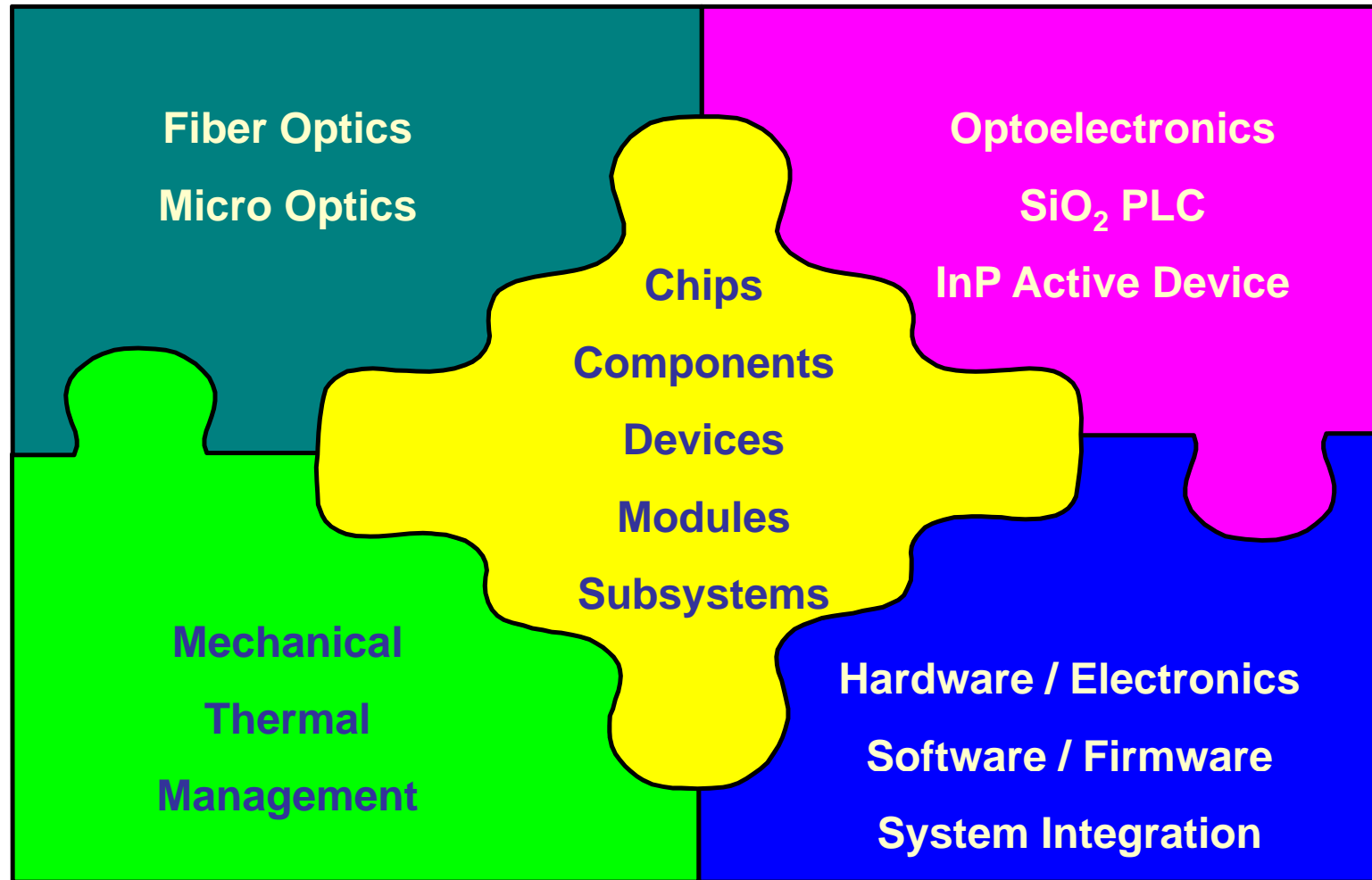


R & D Facilities: 3,600 m<sup>2</sup>  
Manufacturing Facilities: 13,040 m<sup>2</sup>



**Clean Room**

# Technologies



# Accelink and WTD Products



**Chip**



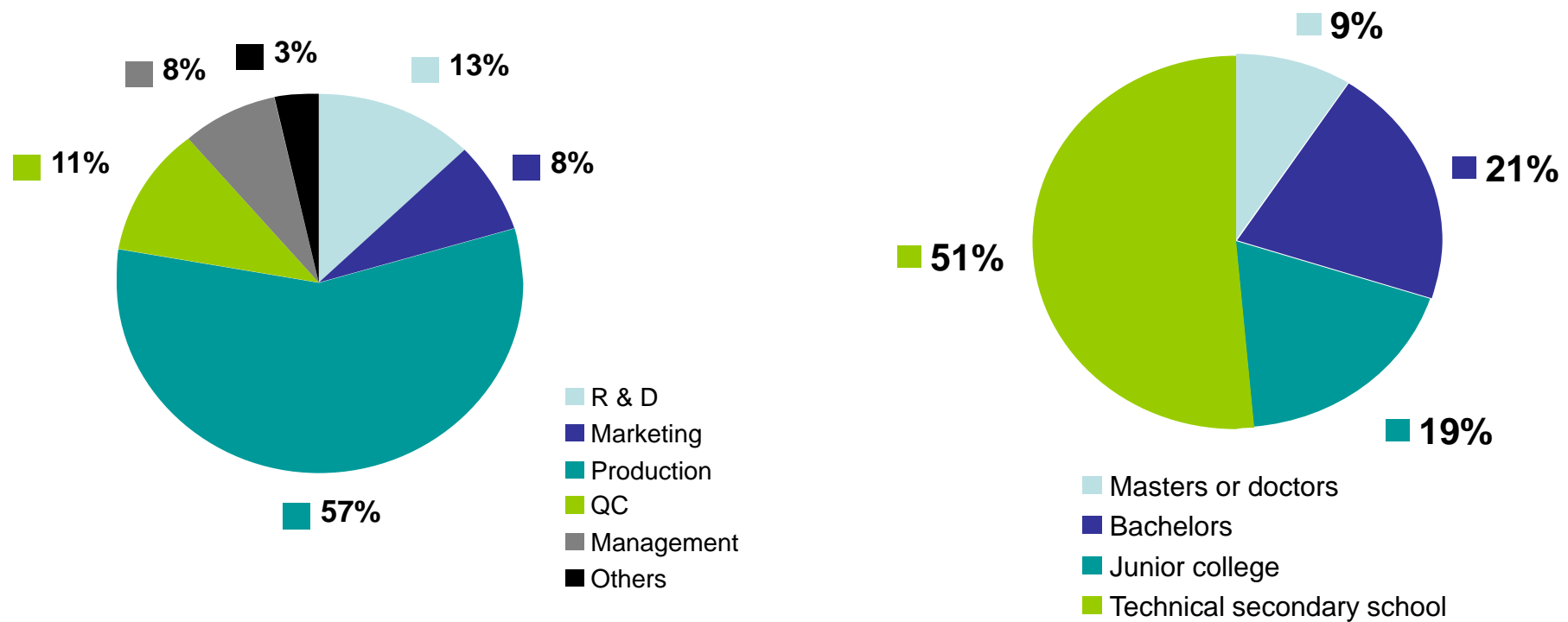
**Component**



**Module**

# Human Resource

- 2300+ employees (Mar., 2008)



# Key Customers

**H3C**

**NORTEL**

**MOTOROLA**



**NXP**  
founded by Philips



Alcatel-Lucent

**RAD**

**NEC**

**Sumitomo**

**SAGEM**

**ADVA**

**LG**

**SAMSUNG**

**HITACHI**  
Inspire the Next

**Fujikura**

**HUAWEI**

**ZTE中兴**

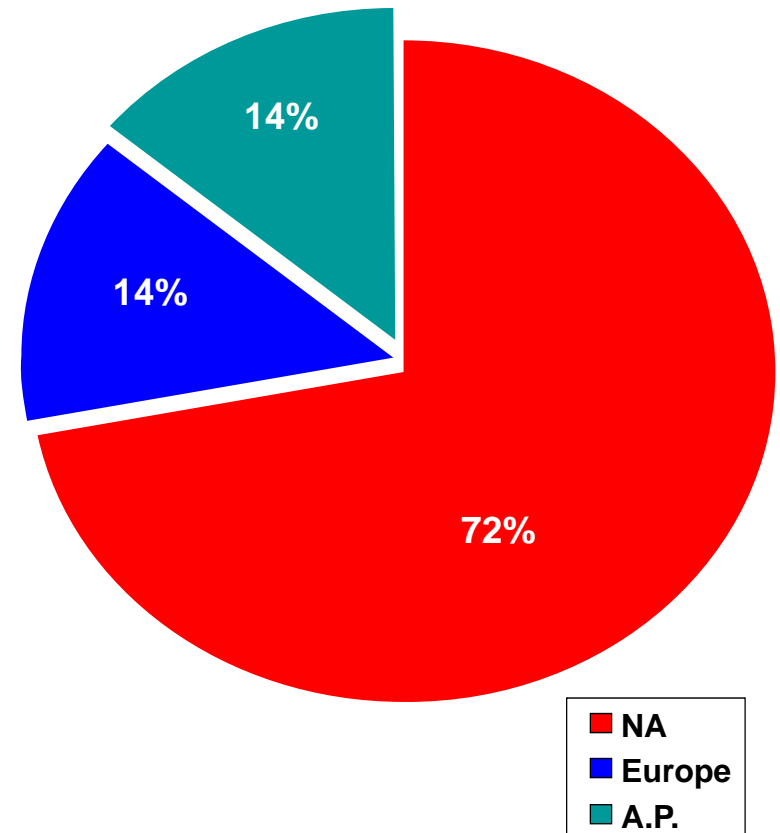
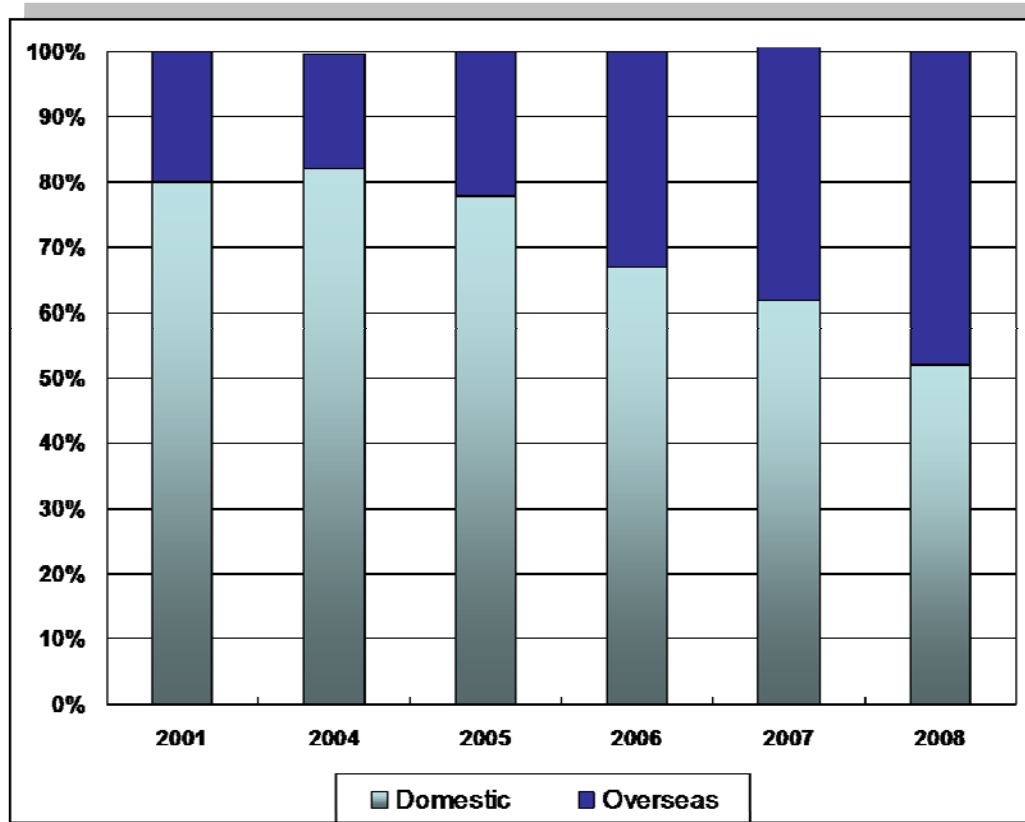
**FiberHome**

**DTT 大唐電信**

**UTSTARCOM**

**RAISECOM**

## Sales Revenue by Region

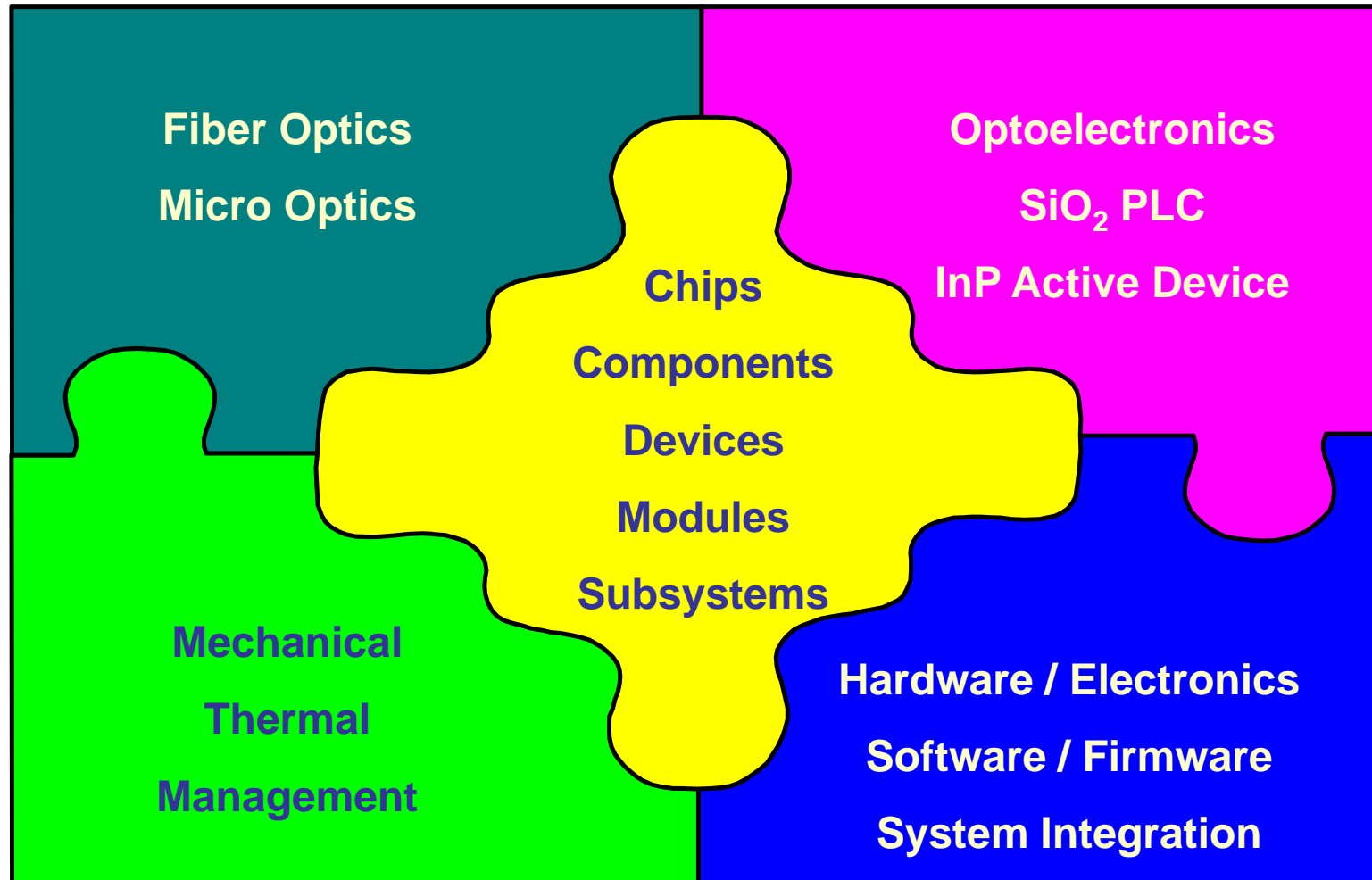


## Outline

- Brief introduction of Accelink
- **Technologies and Products**
- An Example of Customer Design and Supports
- Summary



# Technologies



# Technologies



Fiber Optics  
Micro Optics

- ◆ Optical Device Design & Ray Tracing
- ◆ Crystal Optics & Components Design
- ◆ Surface & Endface Fine Polishing
- ◆ Vacuum Optical Coating & Measurement
- ◆ All Fiber Fused Biconic Taper Technology
- ◆ UV Writing Fiber Bragg Grating
- ◆ Functional Modules & Subsystem Design
- ◆ Assembly & Packaging
- ◆ Fiber Routing & Management
- ◆ Hybrid & Functional Integration
- ◆ Reliability Design & Qualification
- ◆ RoHS Compliance Design

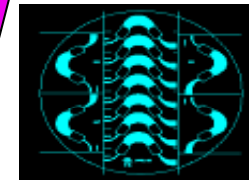


# Technologies



Optoelectronics  
SiO<sub>2</sub> PLC &  
InP Active Device

- ◆ SiO<sub>2</sub> PLC AWG & Splitter Design
- ◆ InP based Active Component Design
- ◆ LP-PECVD & MOCVD Material Preparation
- ◆ Microlithography & Micro-etching
- ◆ Waveguide Processing for PLC & Active Chips
- ◆ Chip Level Testing & Aging
- ◆ Fiber Array & Fiber Attachment
- ◆ PLC & Active Devices Assembly & Packaging
- ◆ Hybrid Integration Technology
- ◆ Monolithic Integration Technology
- ◆ Reliability Design & Qualification
- ◆ RoHS Compliance Design



# Technologies

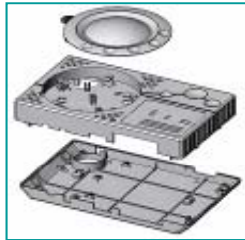
- ◆ Digital & Analog Electronic Circuit Design
- ◆ Digital Signal Processor (DSP) Application
- ◆ LD Driver & TC Controller Design
- ◆ MPC & Firmware
- ◆ FPGA & 2.5/10Gps FEC Design
- ◆ Software / Support Network Protocol
- ◆ Optoelectronic Module & Subsystem Design
- ◆ Multi-Functional Subsystem Develop
- ◆ Customized Modules & Subsystems
- ◆ EMC & Reliability Design & Qualification
- ◆ CE / UL / FDA / FCC Certification
- ◆ RoHS Compliance Design



Hardware / Electronics  
Software / Firmware  
System Integration

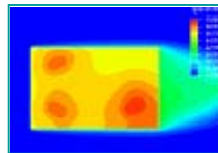


# Technologies



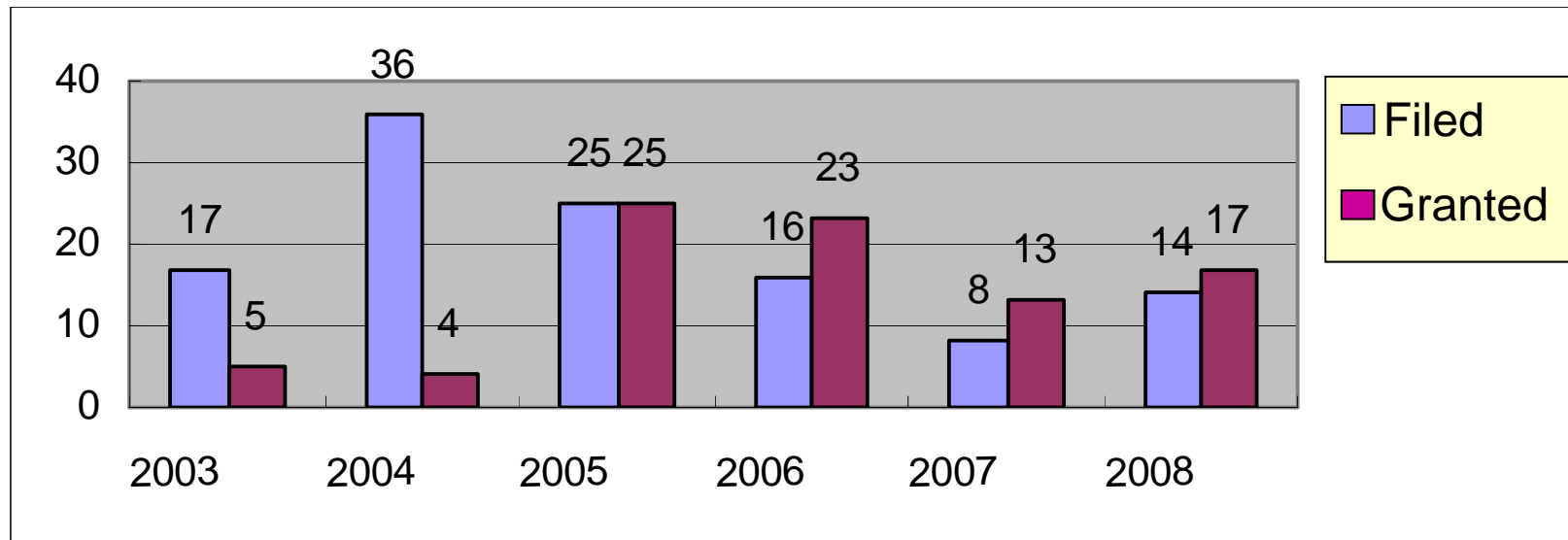
- ◆ Mechanical Structure Design Analysis
- ◆ Precision Machining (CNC Lathe)
- ◆ Multi-axis highly precise alignment
- ◆ Assembly & Packaging Tooling & Fixture
- ◆ Industry Standard Design
- ◆ Multi-Scale Thermal Analysis (CFD)
- ◆ Multi-Level Thermal Management
- ◆ EMI/EMC Design
- ◆ Packing Design
- ◆ Mechanical Reliability Design
- ◆ RoHS Compliance Design

Mechanical  
Thermal  
Management

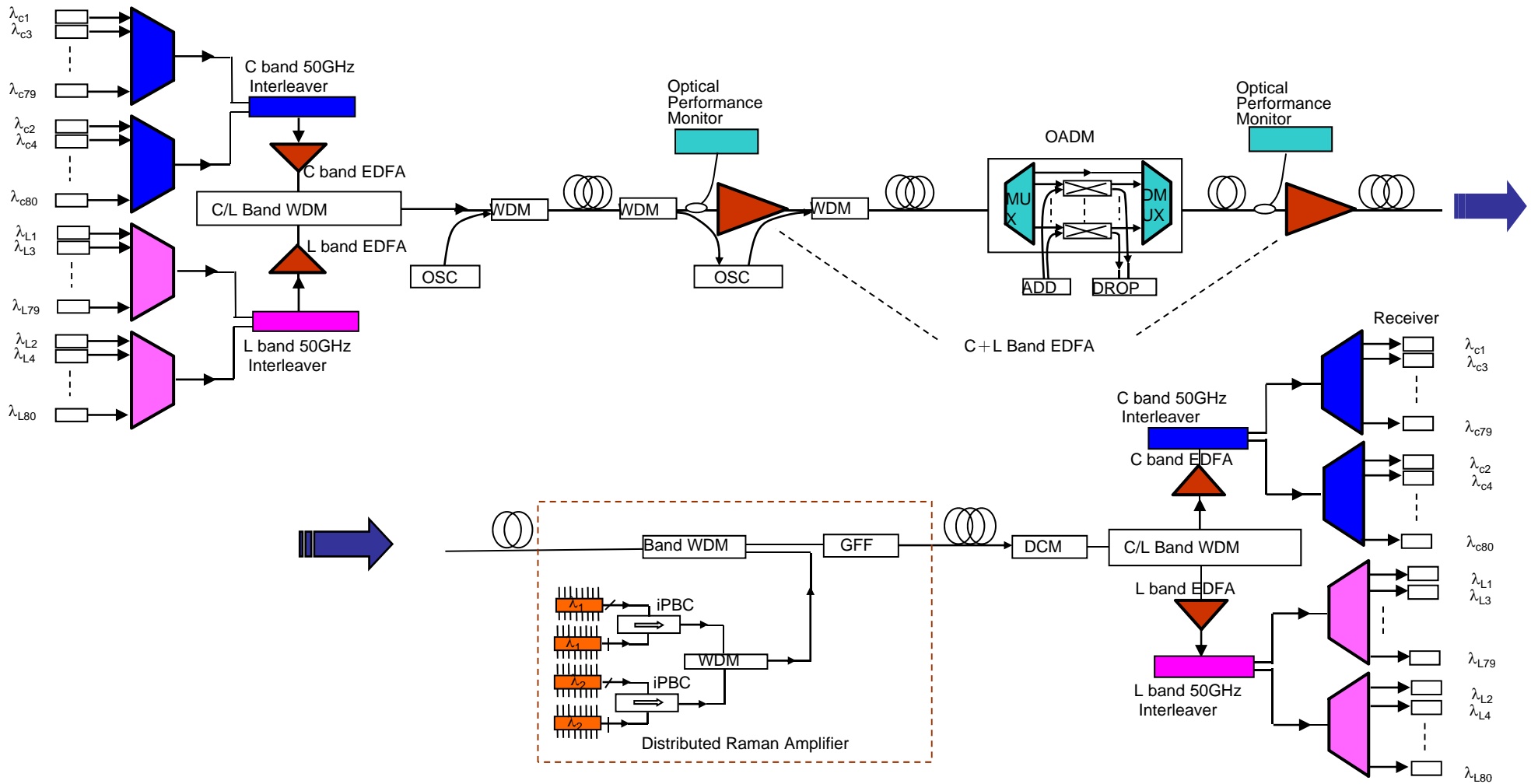


# Intellectual Properties

- Patent (Dec., 2008)
  - 97 granted (4 U.S.)
  - 65 pending (4 U.S.)
- **Normalization and Standard**
  - 30 state standards
  - 37 Industrial standards

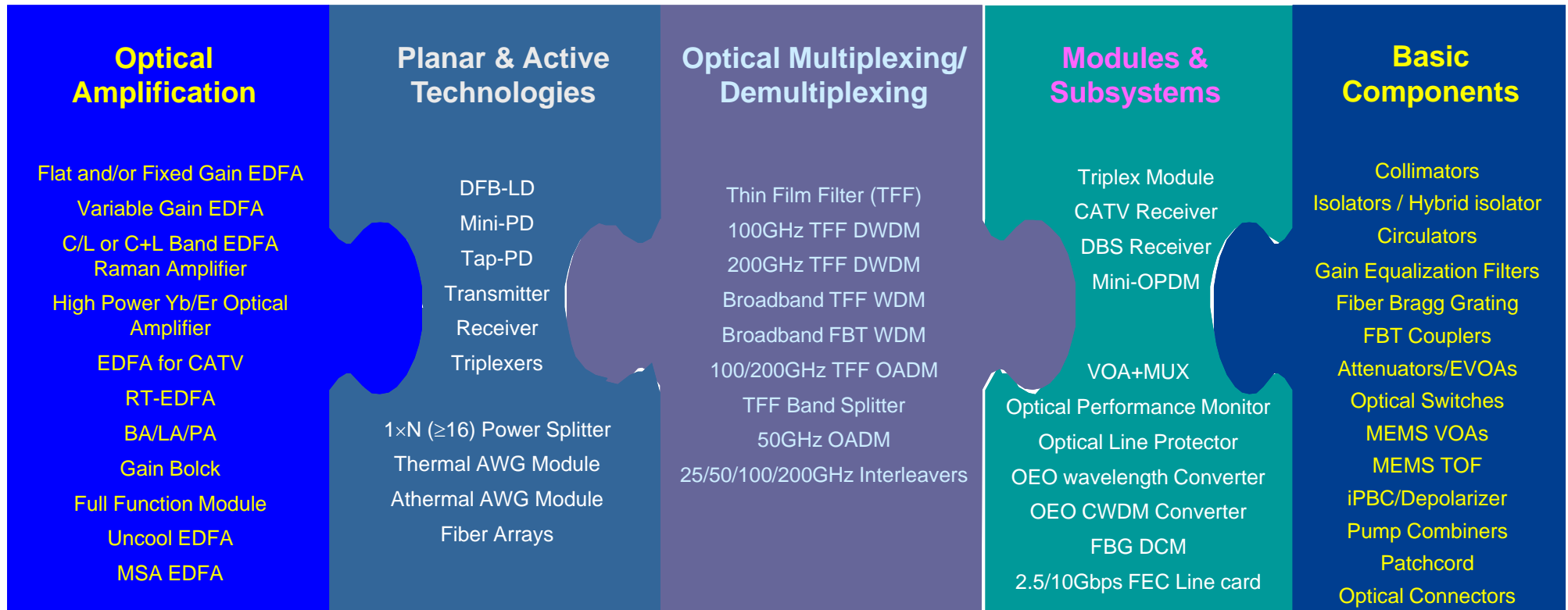


# DWDM System



# Products Portfolio Highlight

## Our products accelerate the cost effective delivery of broadband services





## *RoHS Schedule*

- **All products are RoHS-5 compliant.**
- **All Fiber optic, Micro optic, PLC components & devices are RoHS-6 compliant, and have passed manufacturing verifications and reliability tests.**
- **Most of Optical amplification & Modules / Subsystems, RoHS-6 part numbers are available.**

# Cost Control Advantages

1. The high volume raw material consumption help the lowest purchase prices;
2. The low labor costs comparing with the other competitors in southeast China;
3. State-of-the-art technology and equipment guarantee high yield rate;
4. An veteran management team steering all production and R&D activity high efficiency;
5. Optimize the modules performance by using in-house components.
6. Innovative design and new technologies applied.

## Outline

- Brief introduction of Accelink
- Technologies and Products
- A Few Examples of Innovative Design and The products
- Summary

# Polarization Independent Manually Variable Optical Power Splitter



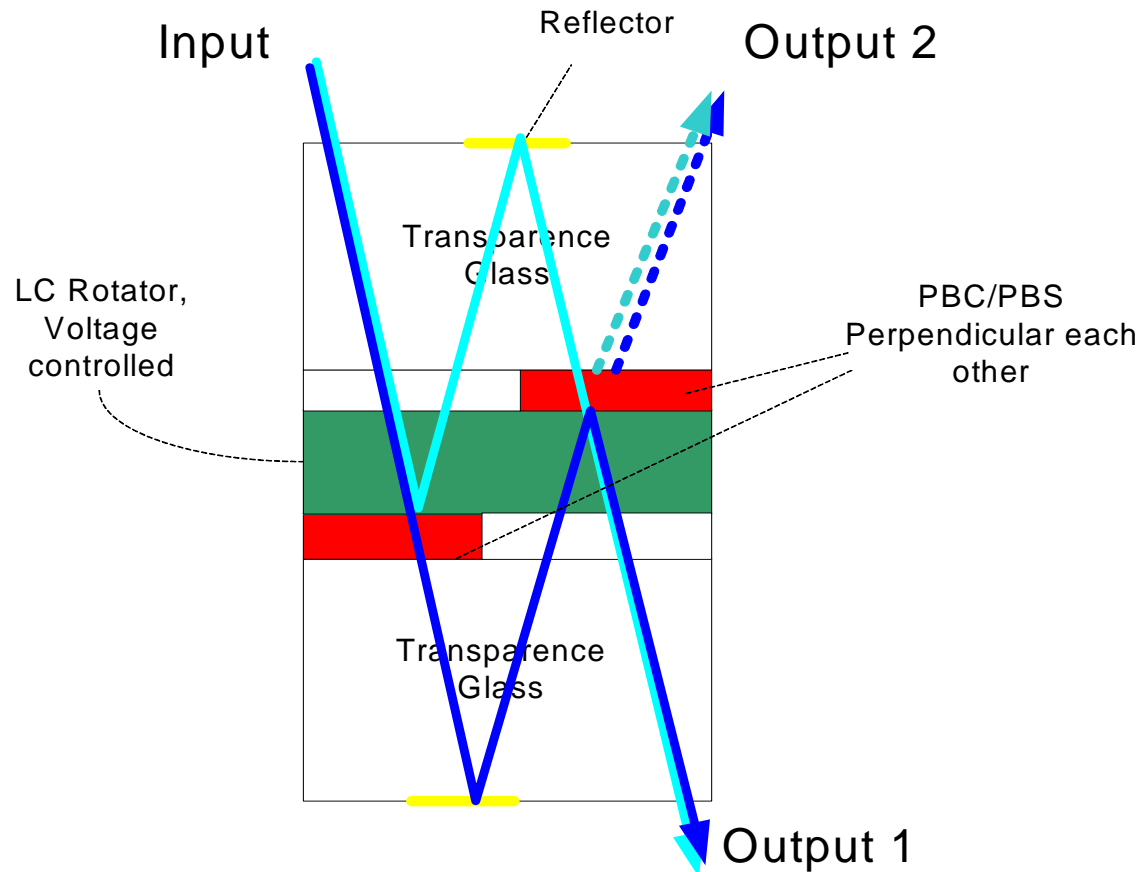
## Features

1. Polarization Independent
2. Full variable range: 0.1%~99.9%
3. High power tolerance: up to 2W optical power
4. Multi function device: work as VOA, Switch, Variable tap and Dynamic Power splitter
5. Potentially low-cost: The cost is only slightly higher than the VOA product
6. High stability and excellent reliability

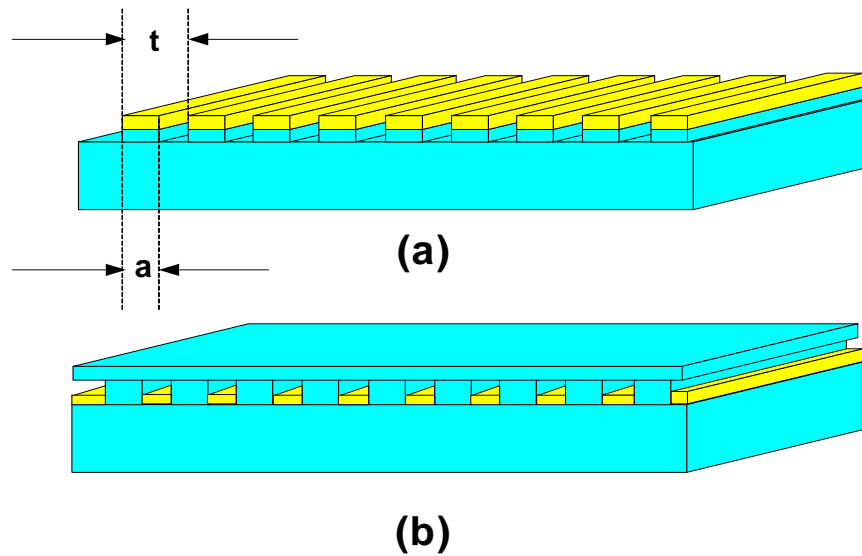
## 1x2 VOPS specification

	Parameter	Value	Unit
1	Center Wavelength	1550	nm
2	Wavelength Range	1525~1565	nm
3	Insertion loss	<0.8	dB
4	Uniformity	<0.3	dB
5	Directivity	>45	dB
6	Tunable Range	0~20	dB
7	Return Loss	>50	dB
8	PDL(on 0dB )	<0.30	dB
9	Package Dimension	9.5×14.3×73	mm
10	Operation temperature	°C	-40 ~ +85
11	Storage temperature	°C	-40 ~ +85

# Variable Power Splitter Realized with nano-grating



# “863”计划新材料领域纳米专项课题



**Figure 1** 用于分离两偏振光的新型纳米光栅 (b) 与传统纳米光栅 (a) 结构之比较

# “863”计划新材料领域纳米专项课题

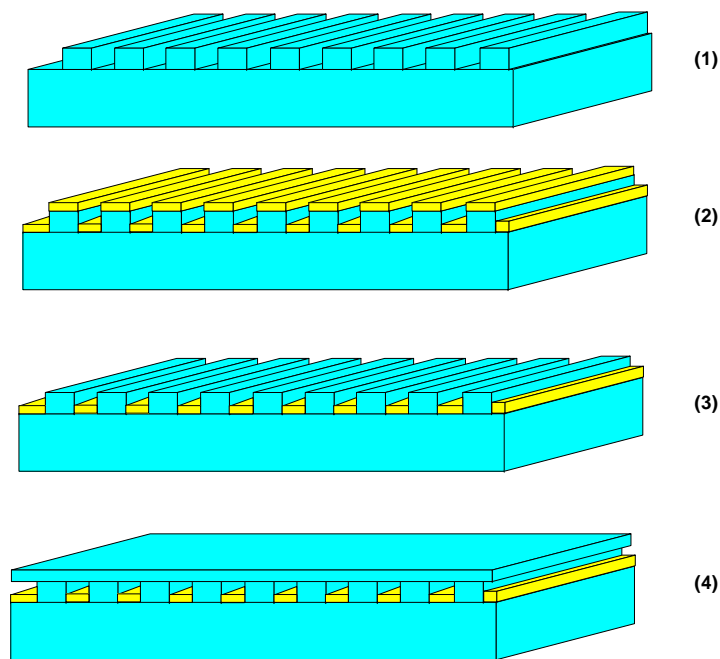
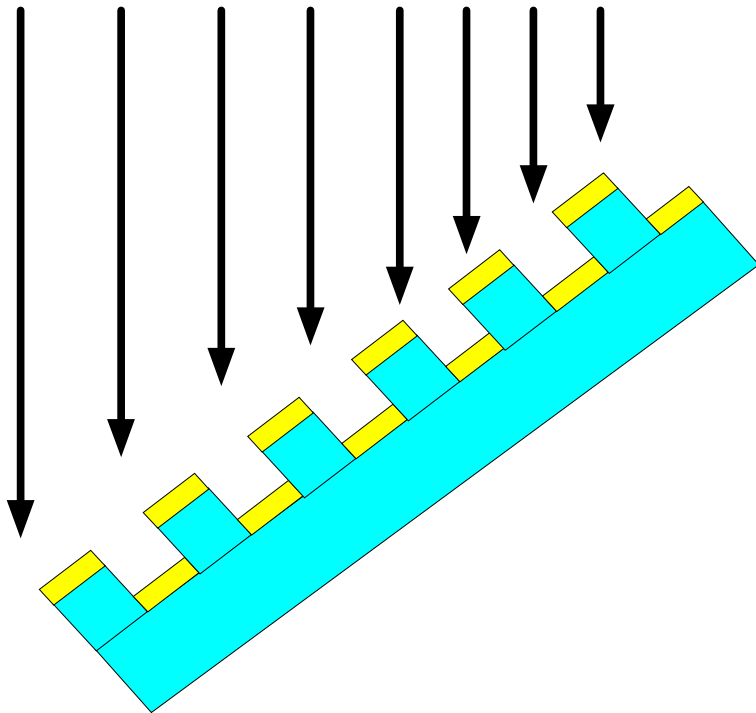


Figure 2 新型纳米光栅的具体实施步骤

- (1) 首先用同步辐射x射线光刻制作普通纳米级光栅
- (2) 在光栅表面均匀镀上金属反射膜。
- (3) 用机械抛光或离子束倾斜刻蚀方法去掉光栅脊背上的金属膜。
- (4) 以倾斜角度，用溅射或电子束蒸发方法将与衬底同质的材料覆盖在光栅表面。

# “863”计划新材料领域纳米专项课题

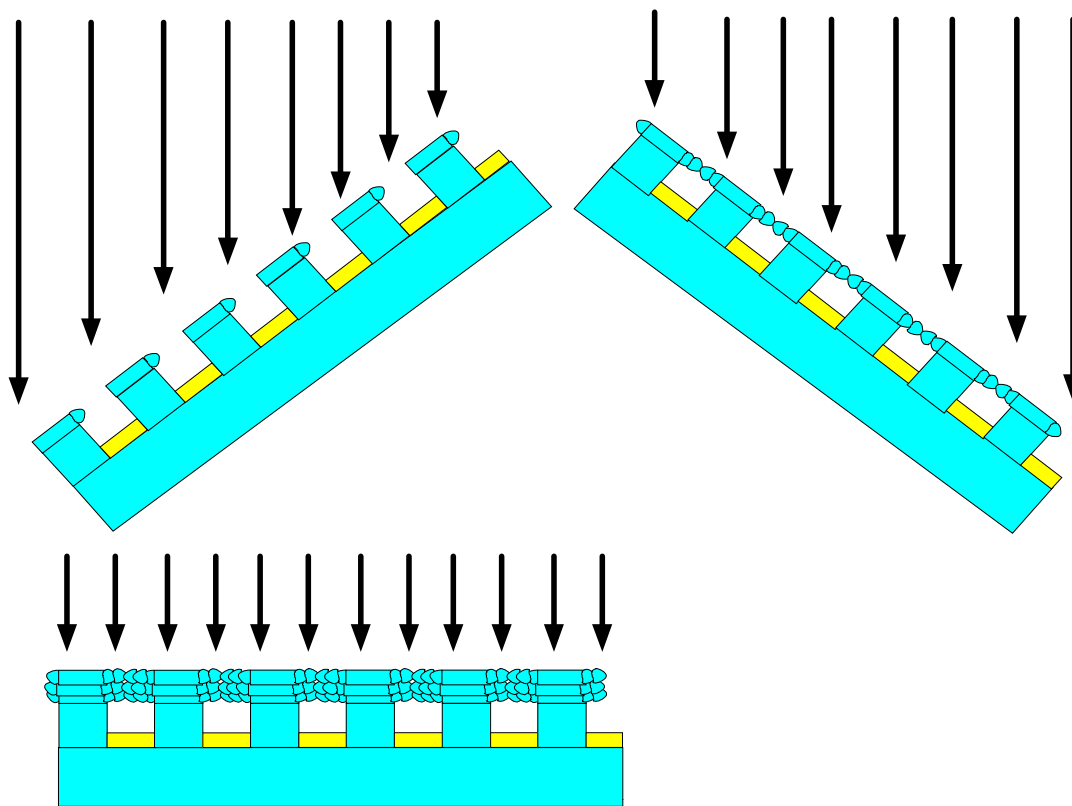
**Figure 3** 用离子束倾斜刻蚀方法  
去掉光栅脊背上的金属膜的具体实施步骤





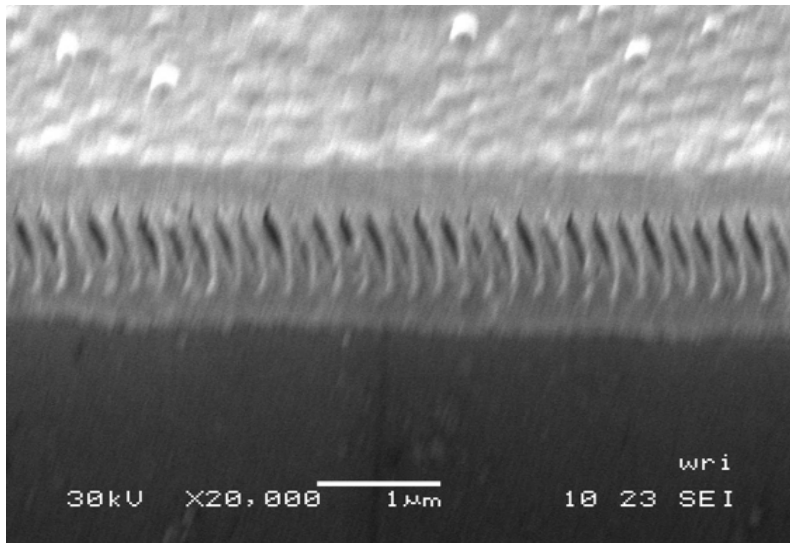
# “863”计划新材料领域纳米专项课题

Figure 3. 以倾斜角度，用溅射或电子束蒸发方法将与衬底同质的材料覆盖在光栅表面。

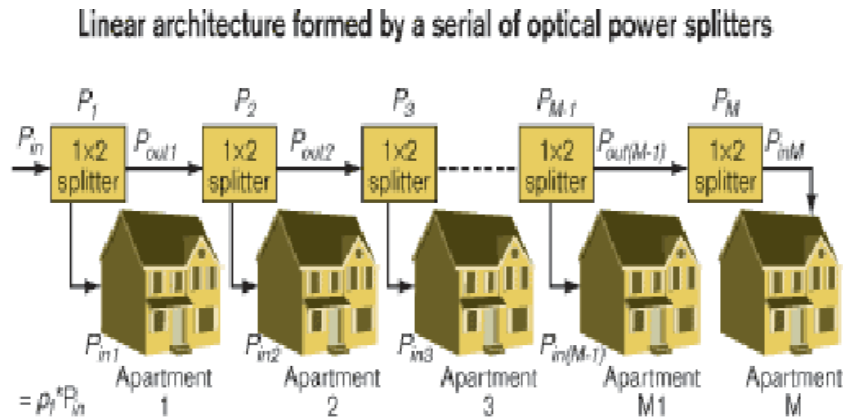


## The embedded grating structure and performance parameters

Ag film thickness (340 nm thick), air-gap (480nm thick) and upper cladding SiO<sub>2</sub> layer (380nm thick) with a 200nm period and 0.75 duty cycle were chosen to optimize the properties of this newly developed wire grid polarizer. The measured polarization properties were done using a 1550nm laser light with an incident angle of 20°. The measured transmission loss for P beam and reflection loss for S beam is 0.15~0.18 dB and the extinction ratio are larger than 40dB and 25 dB respectively.

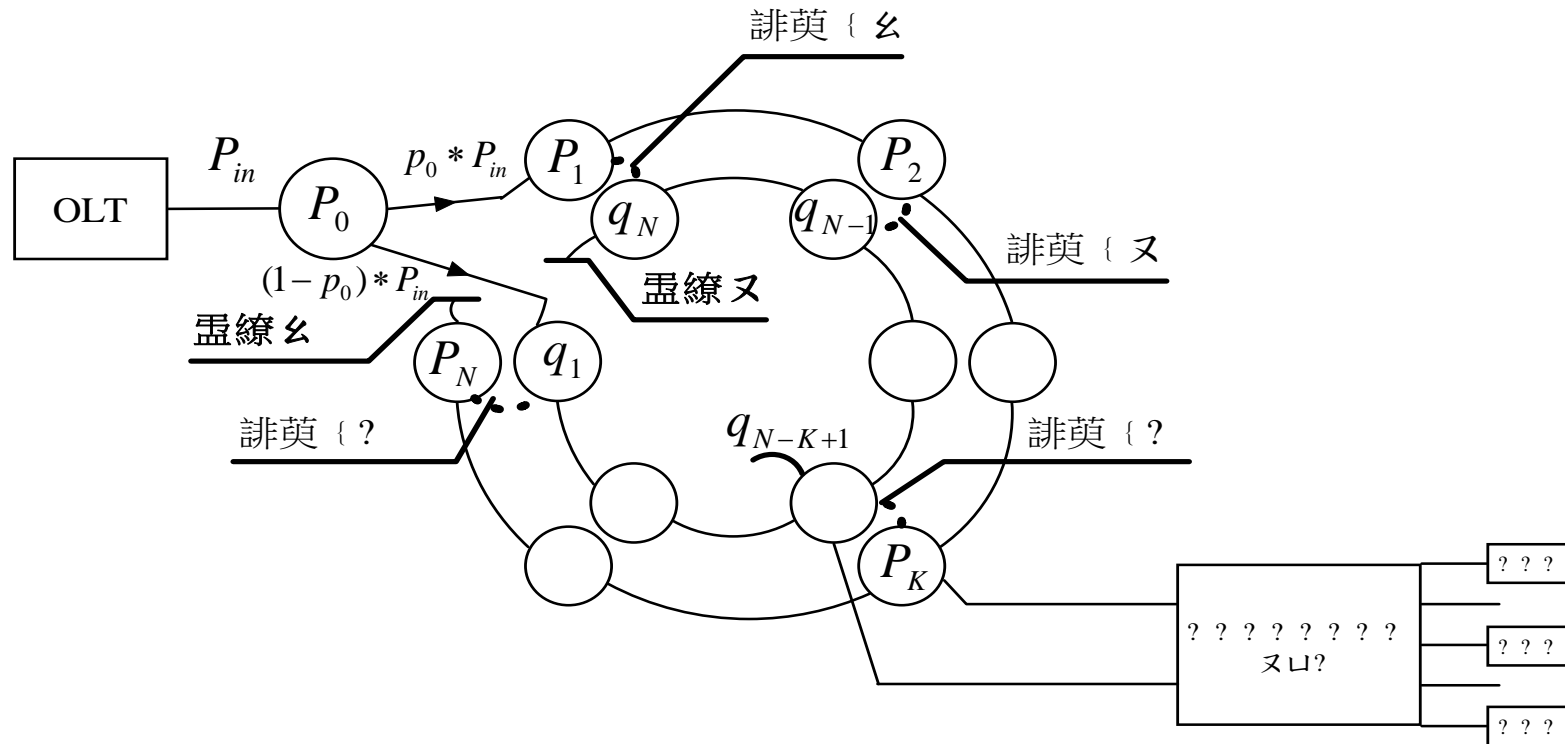


# Variable Splitter Application



- ☺ 1) Variable OPS will improve network scalability, increase optical power efficiency, provide better network reliability, and lower investment risk;
- ☺ 2) When all user are connected serially, Variable OPSs can equalize the power delivered;
- ☺ 3) In addition, the furthestmost user has the biggest optical power loss as well as the greatest possibility of being disturbed. Variable OPSs can allocate more optical power to the users farther from the OLT to strengthen their anti-jamming ability.

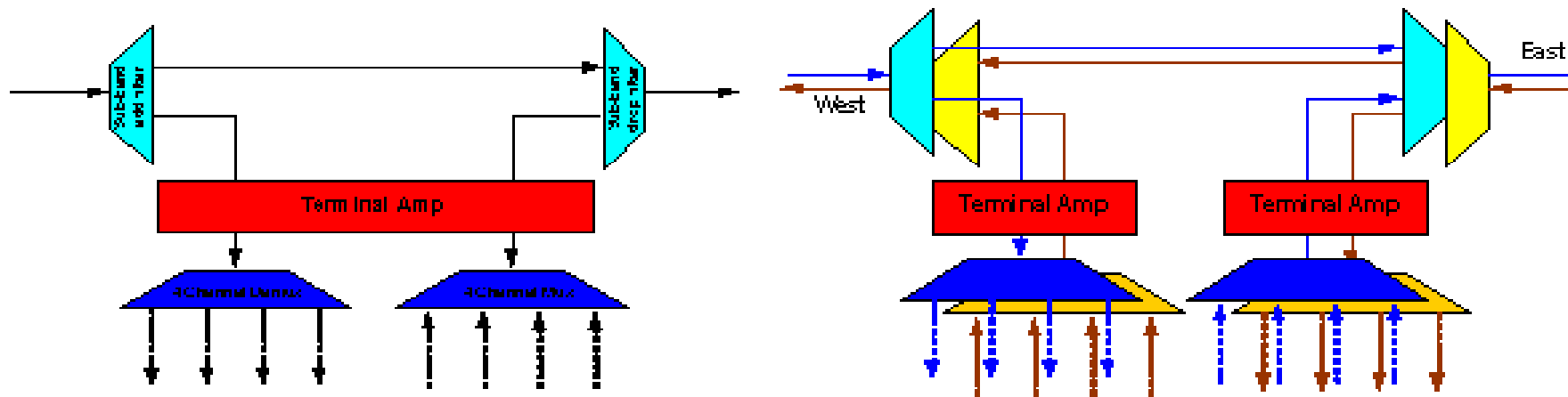
## VOPS Application in Self-healing PON rings



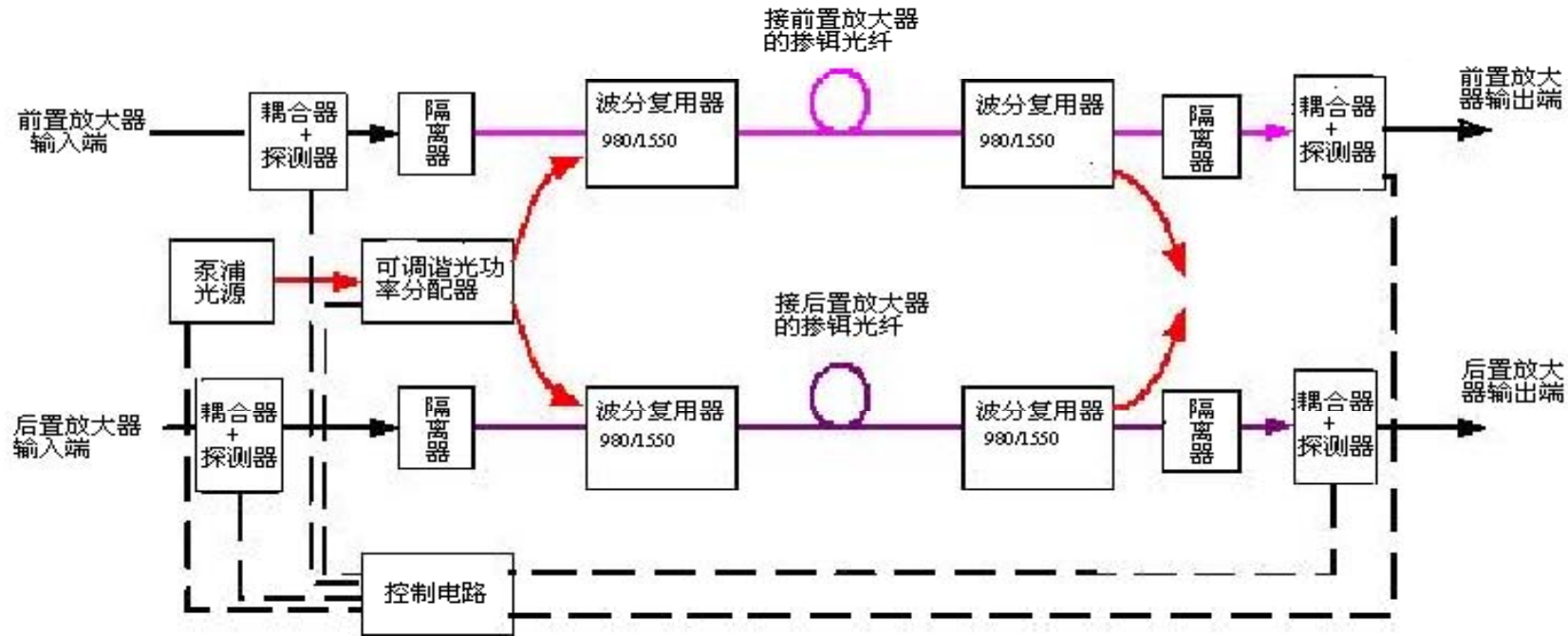
**The use of variable optical power splitters can create a dual self-healing ring network for PON applications.**

*By Lightwave March 2005*

# Application of Smart EDFA: Amplify for both transmitter and receiver



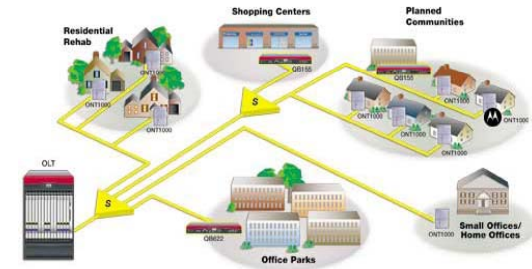
# Bidirectional Smart EDFA Design Realized With VPS



双通道双向放大器的具体设计. 采用可调光功率分配器的设计可以实现将放大器总的增益在收发两个方向上的动态调整.

# High Power Multi Ports Amplifier for FTTH

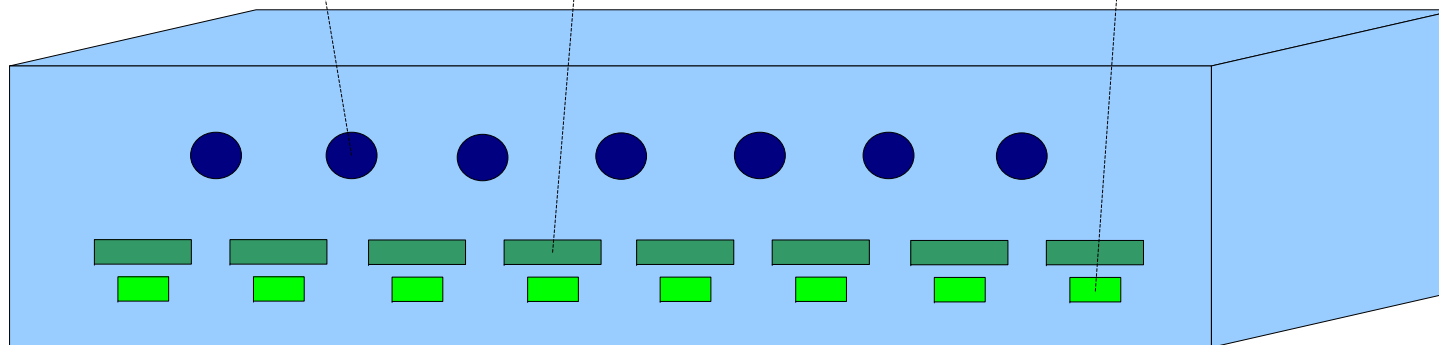
1. Each Port Power is adjust able with a screw driver;
2. Each Output port with LC power monitoring.



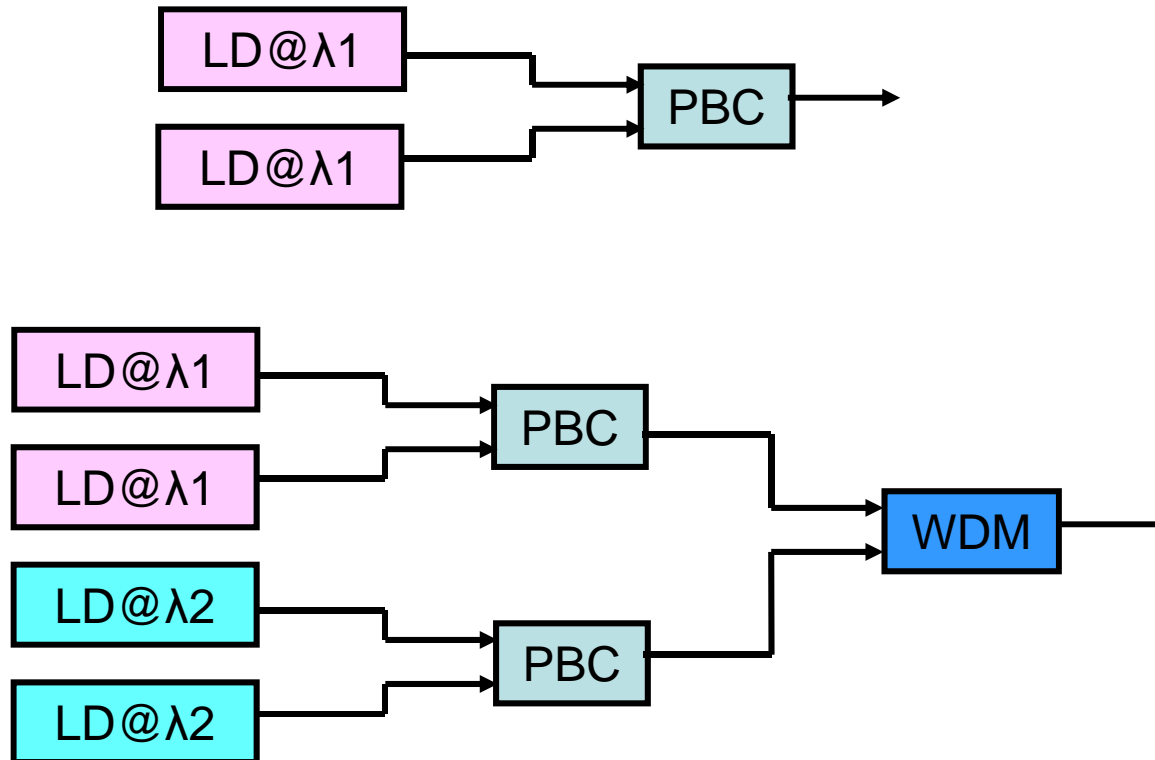
Screw driver tunable  
Power splitter

Power monitoring  
LC Screen

Fiber output  
adaptor



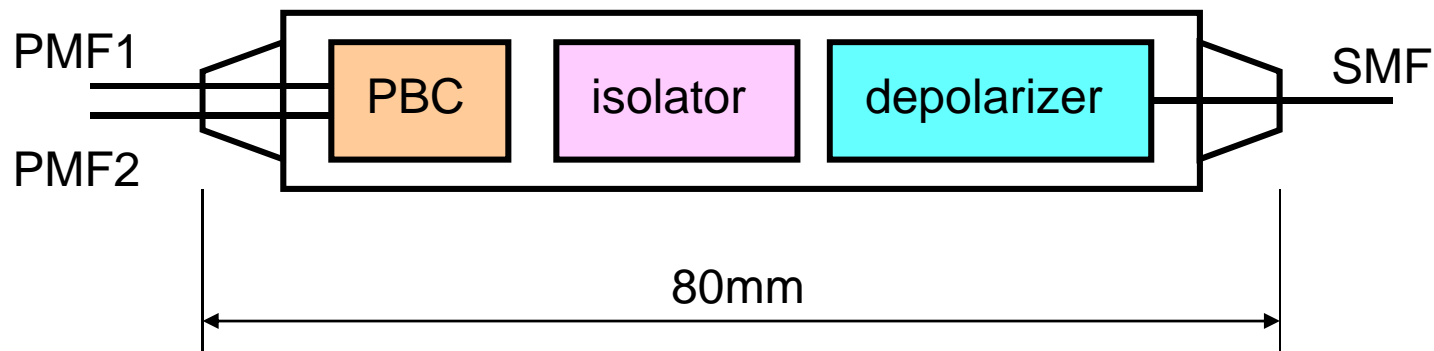
## Traditional RFA Design



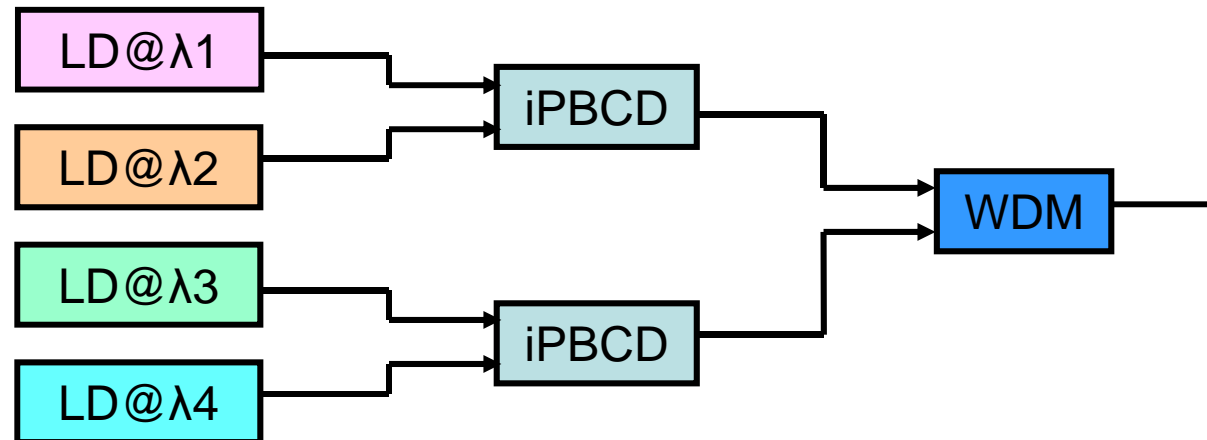
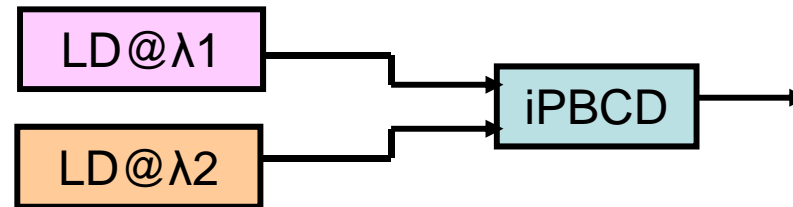


# Patented iPBCD

- **Integrated polarization beam combiner, isolator and depolarizer in a compact package**



## Novel RFA Design



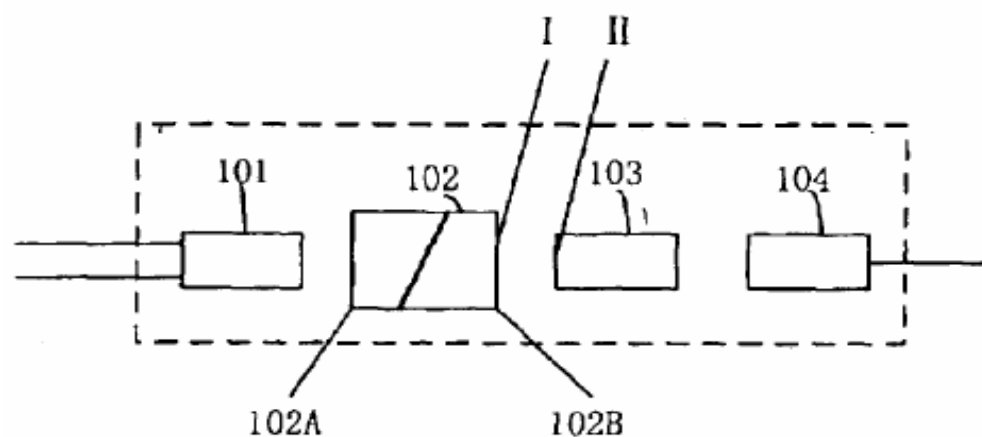
# Innovative Amplifier Design

**U.S. Patent**

Dec. 14, 2004

Sheet 1 of 5

**US 6,831,778 B2**



(57)

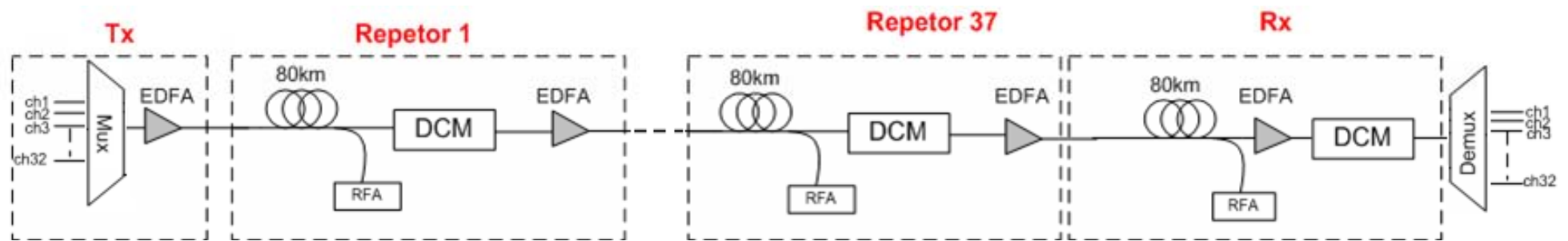
## ABSTRACT

The present invention relates to a hybrid component and method capable of simultaneously combining and depolarizing two pump laser diodes of different wavelengths with linear polarized output. The beam combiner is a Wellstone prism which is used to combine two linear-polarized pumping beams, and the depolarizer has three different embodiments: a single stage high birefringent waveplate; two stages high birefringent waveplates; a quarter waveplate or a three-quarter waveplate plus a single stage high birefringent waveplate. The Polarization Beam Combiner (PBC) and the depolarizer are integrated into one single hybrid component, in which two orthogonal pumping lights with different wavelengths are combined and depolarized simultaneously. Therefore, the hybrid component and method makes it simpler and cheaper to design a Raman amplifier and will propel Raman amplifier market penetration in optical communication systems.

## Benefits of Novel FRA Design

- ☺ **Flexibility for pump wavelength design**
- ☺ **Flat gain spectrum**
- ☺ **Pump laser individually adjustable**
- ☺ **Reduce pump laser numbers**

## Hybrid Amplification in ULH System

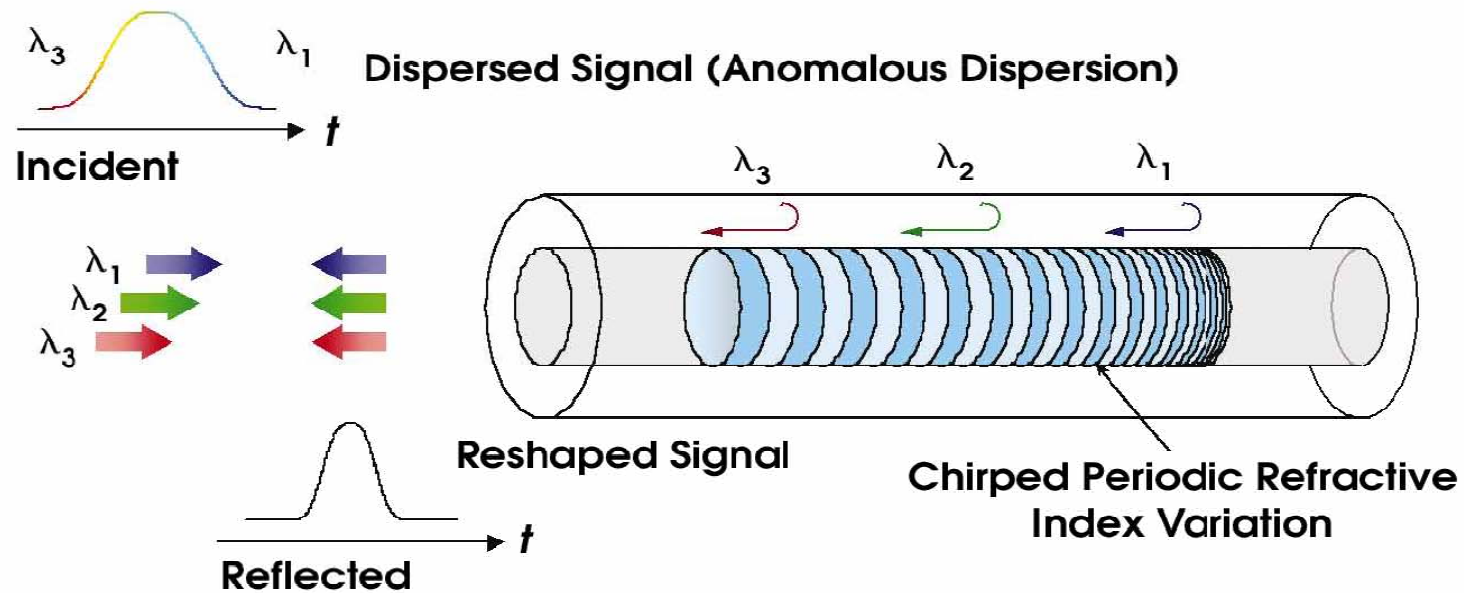


- Raman and EDFA hybrid amplifier in ULH system with distance  $>3,000\text{km}$
- Raman and EDFA hybrid amplifier in ultra long span with distance  $>300\text{km}$

# Wideband Multi-channels DCM based on FBG



# Principle of Chirped Fiber Bragg Grating for Dispersion Compensation



$$\lambda_B = 2n\Lambda$$

$$n(z) = n_{\text{core}} + \delta n \left[ 1 + \cos \left( \frac{2\pi z}{\Lambda} + \varphi(z) \right) \right]$$

# Main Feature

Optimized residual dispersion and broadband dispersion compensation in DWDM system;

100% slope compensation of G652 and G655 fibers in C-band or L Band ;

Low insertion loss;

Low Polarization Mode Dispersion;

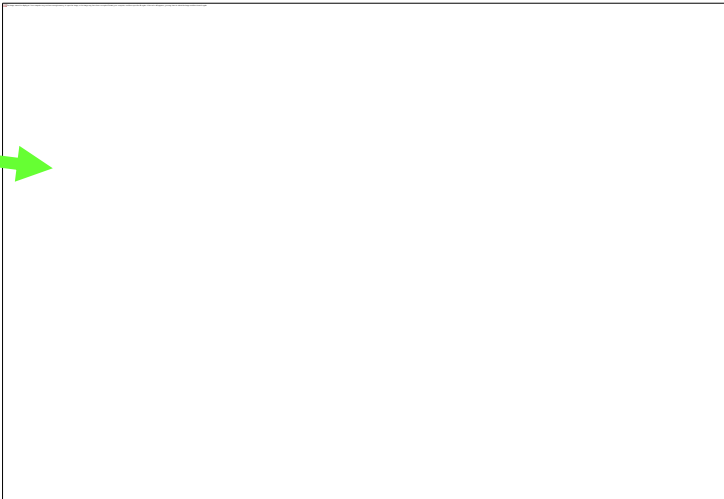
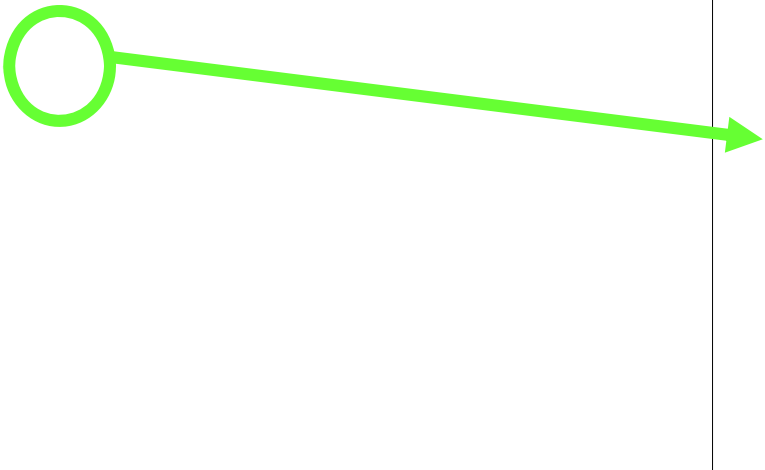
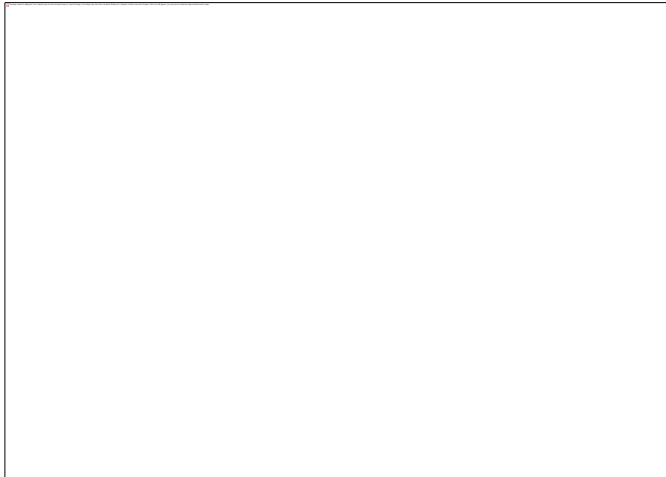
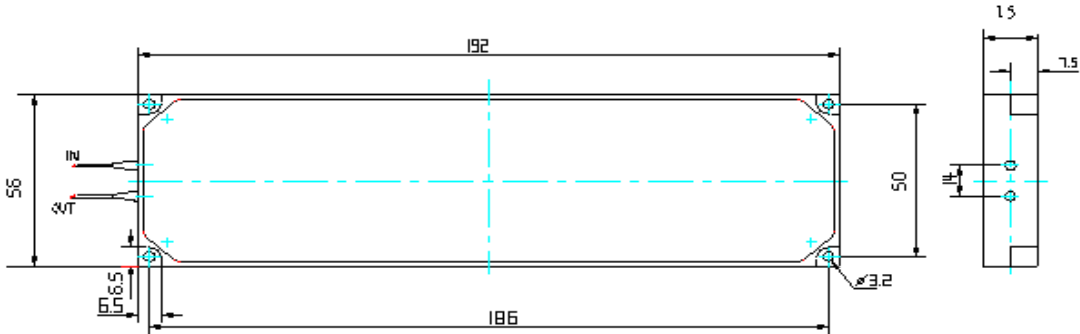
Telcordia GR-2854-CORE qualified;

## Specification

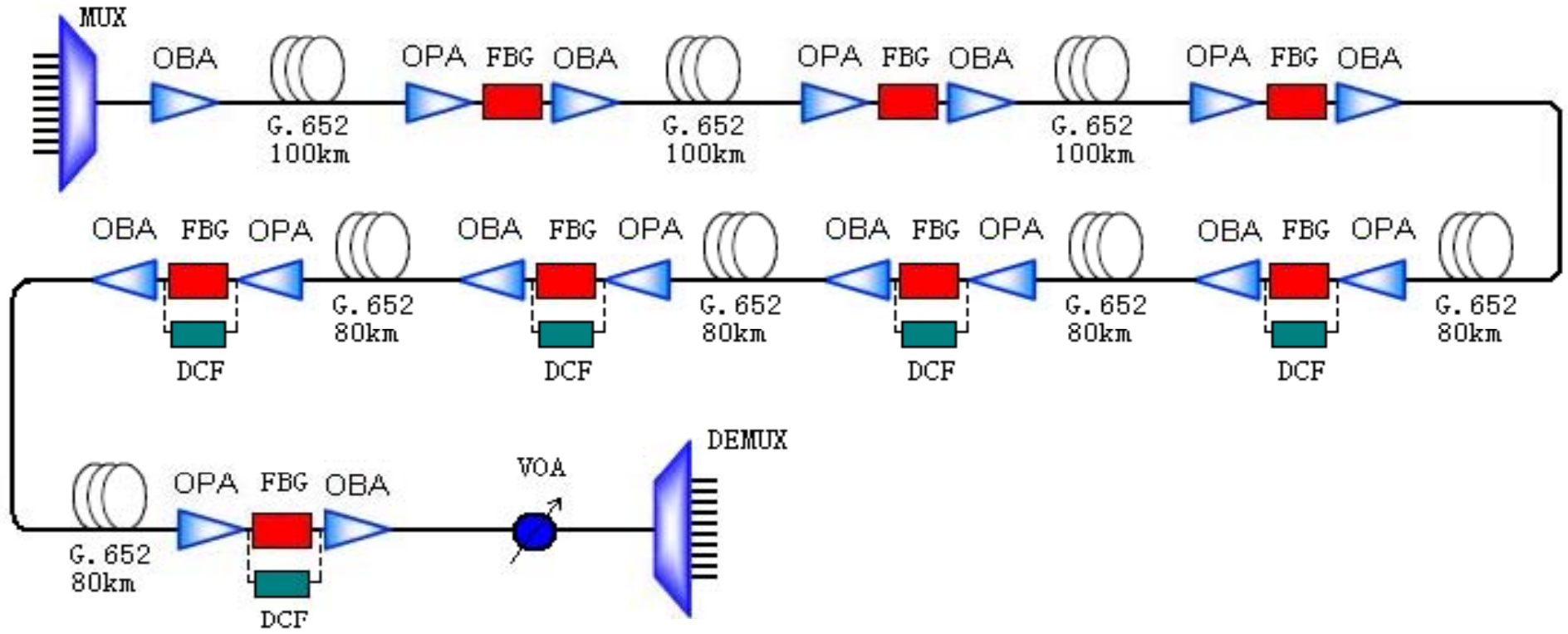
Item	Spec					
补偿长度 (km)	20	40	60	80	95	100
起始通道波长 (nm)	1527.216					
结束通道波长(nm)	1567.133					
工作带宽 (GHz)	30					
通道间隔 (GHz)	100					
首通道色散 <sup>2,3</sup> (ps/nm)	-314.0	-628.1	-942.1	-1256.1	-1491.6	-1570.1
末通道色散 <sup>2,3</sup> (ps/nm)	-359.5	-719.1	-1078.6	-1438.1	-1707.8	-1797.7
群时延抖动 <sup>2</sup>	< 15 ps	< 15 ps	< 15 ps	< 15 ps	< 20 ps	< 20 ps
PMD	< 0.7 ps	< 0.7 ps	<1.0 ps	< 1.5 ps	< 1.5 ps	< 1.5 ps
色散容限	< 5%					
插入损耗 <sup>4</sup>	< 2.0 dB (不含环形器), < 3.5 dB (含环形器)					
插损一致性	< 1.0 dB					
通带内插损变化	< 1.0 dB					
PDL	< 0.1 dB (不含环形器), < 0.3 dB (含环形器)					
回波损耗	> 40 dB (including circulator)					



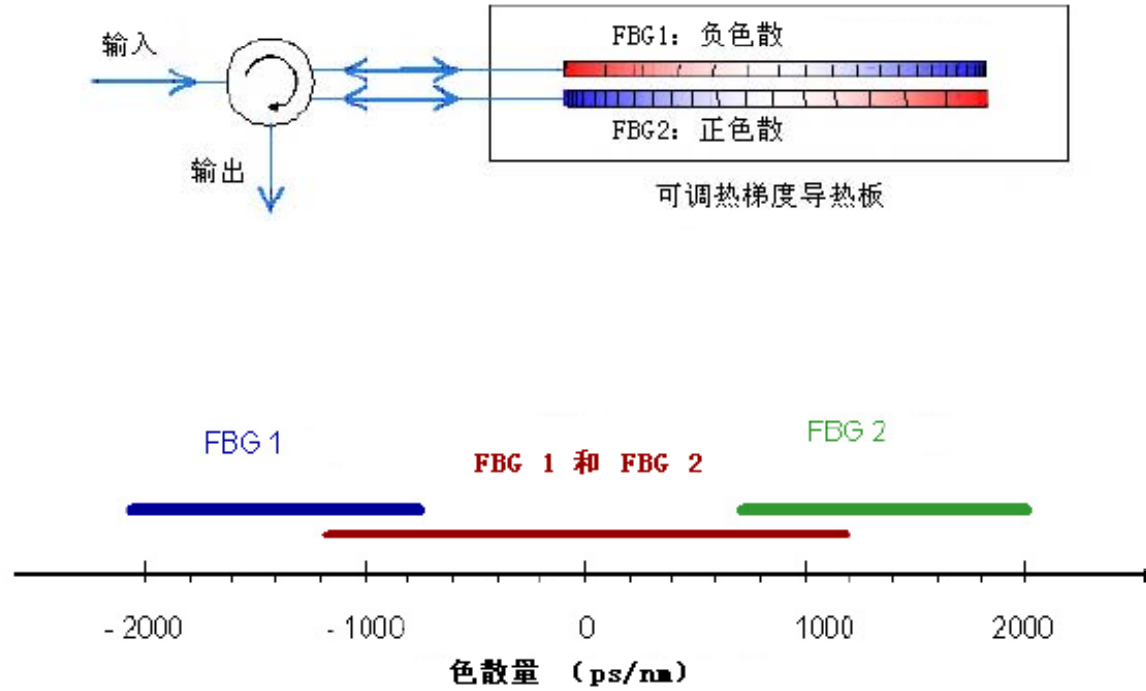
# Wideband Multi-channels DCM based on FBG



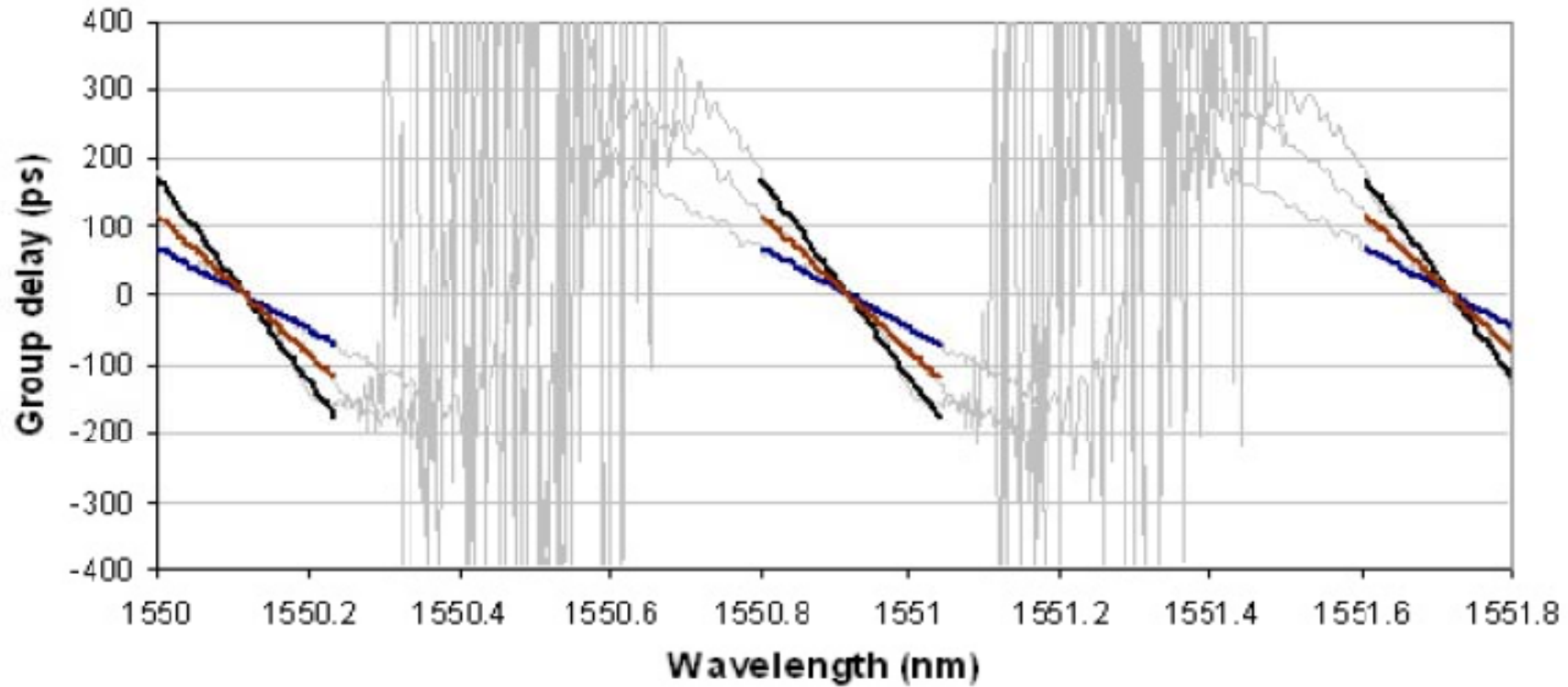
# 10G DWDM Long Haul Test Bed with Cascade DCM (FBG or Fiber) and EDFA



## Principle of tunable dispersion compensation module

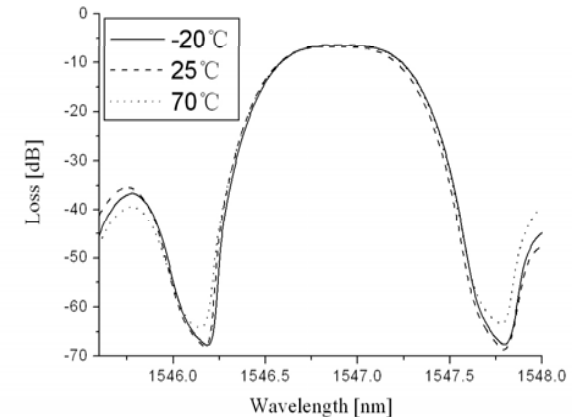
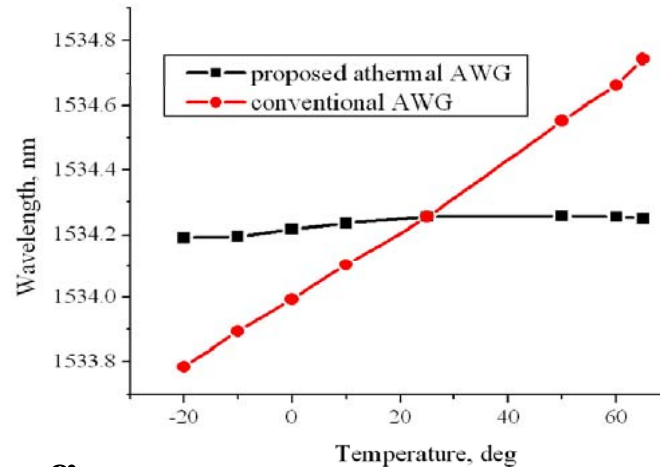


## Dispersion adjustment result



## *New products: Flat Top Athermal AWG*

### *with Enhanced Performance*



### Main Features and Benefits

1. Pure passive device, no temperature control circuit;
2. Extending the operating temperature: -10-70°C ;
3. Improving the adjacent crosstalk: -42dB (typical); Improving the total crosstalk: - 32dB (typical);
4. Potentially low-cost: The cost of athermal AWG module only slightly higher because the AWG chip size smaller and high production yield, although the increase of Interleaver cost.

## Patented AWG Design

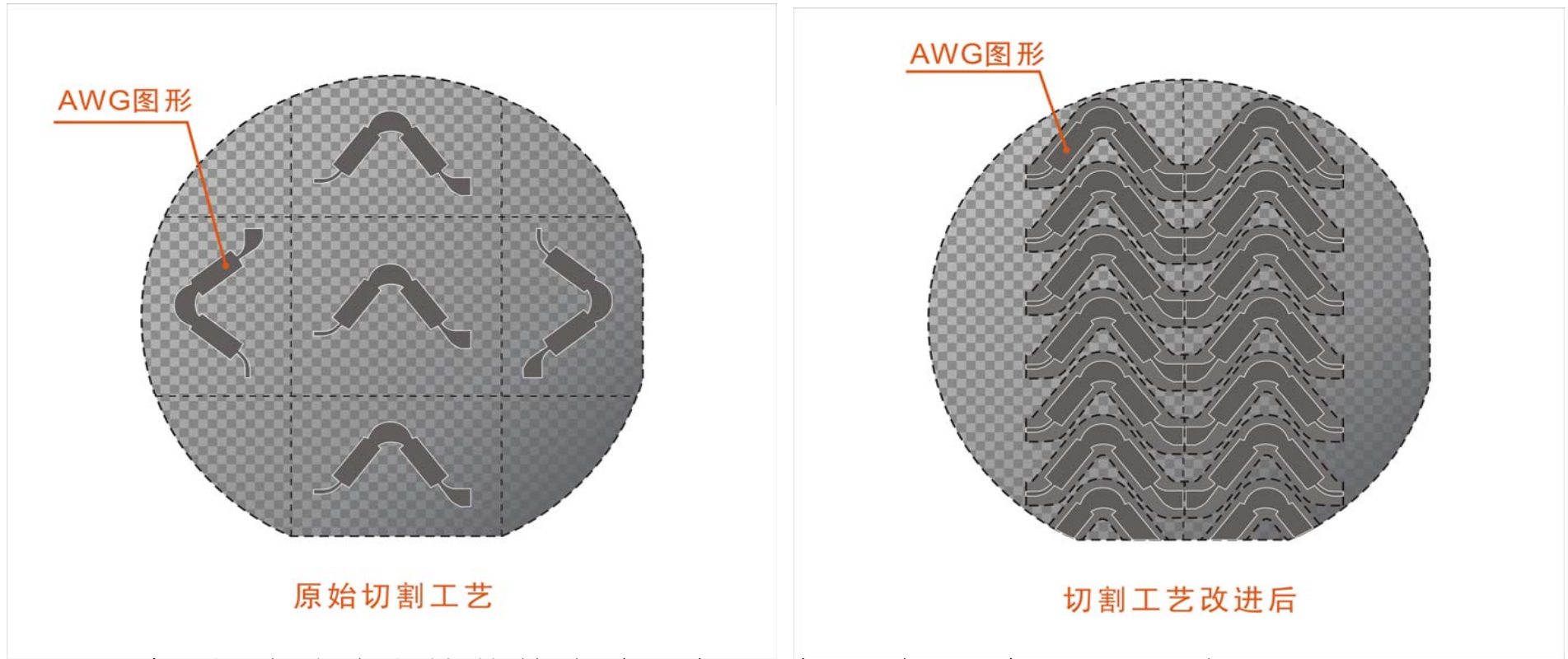


公司在所承担的国家“十五”863高科技项目——平面光波导器件自动耦合封装系统研发过程中，申请了3项发明专利，并开发出了具有自主知识产权的自动封装系统，该系统技术达到国际先进水平，避免了手工对准封装重复性差、光纤和波导器件耦合效率低等缺点，大大提高了封装效率、质量，增强了光波导器件在市场的竞争力。

# Patented AWG Design



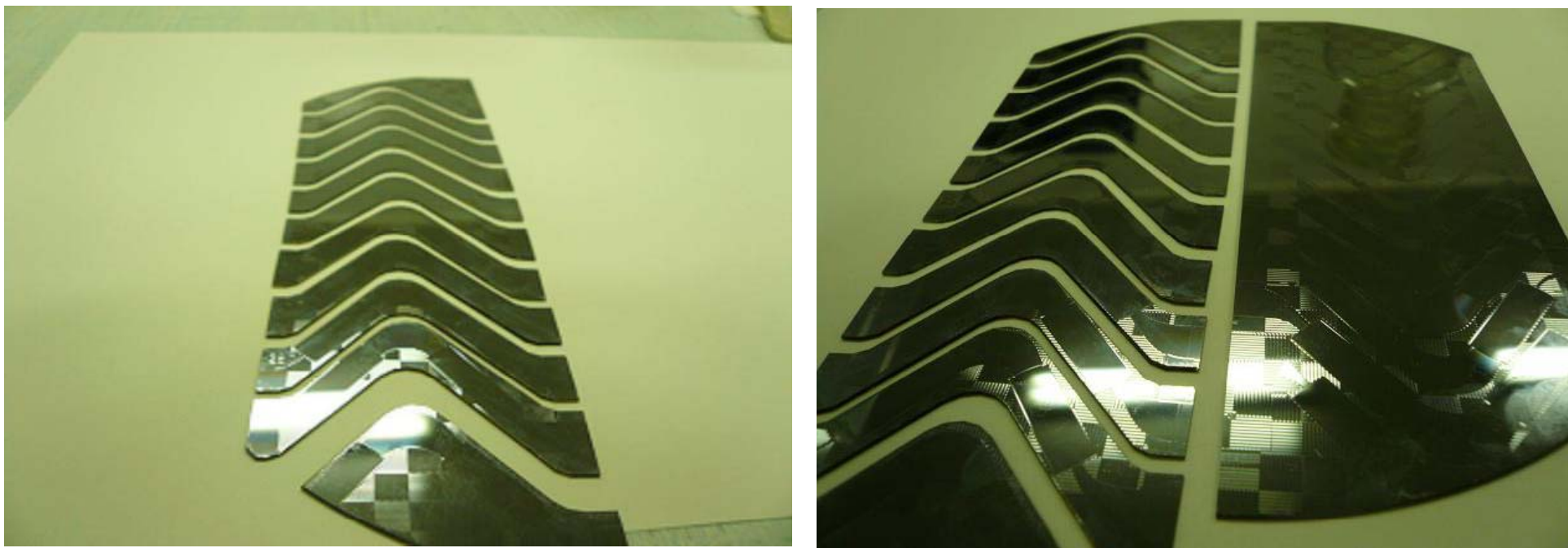
# 低成本AWG解决方案



- ☉ 一个6英寸硅片上按传统直线切割方法,可放置5个**AWG**芯片;
- ☉ 采用曲线切割工艺后,有效芯片数量达到**12**个.
- ☉ 上述曲线切割工艺已经申请了中国专利.

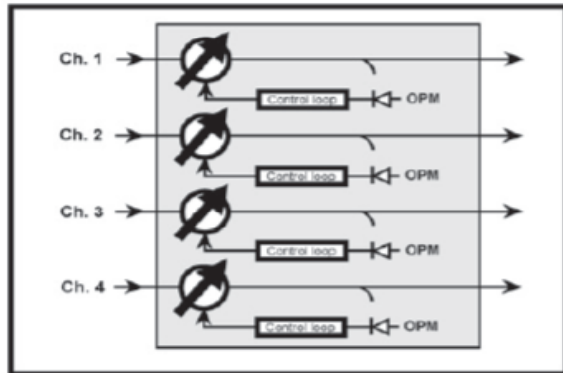


## 曲线切割AWG的实物照片



- 左图为 **40通道100G间隔AAWG**芯片实物照片. 右图为切割前后芯片对比.
- 芯片侧面光滑,经测试,其指标和可靠性与直线切割的一致.

# Muti-Channel EVOA array



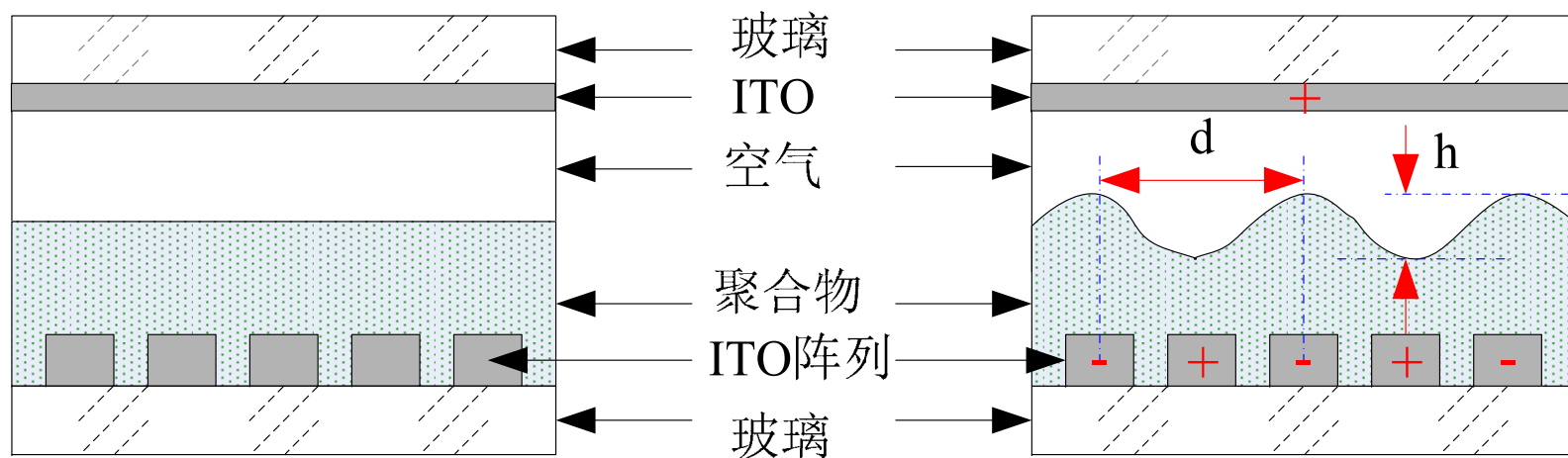
Block Diagram

4 Channel VOA Array w/Optical Power Monitoring (VOA-OPM)			
Parameter	Value	Unit	Comments
Wavelength range	1525 - 1565	nm	
Attenuation range	20	dB	
Response time	< 5	ms	10-90% rise/fall time
Maximum non-destructive optical power input	0.5	W	
Insertion loss	< 1.0	dB	No connectors, including OPM-capability
Polarization mode dispersion	< 0.05	ps	
Polarization dependent loss	< 0.1	dB	
Wavelength dependent loss	< 0.008	dB/nm	
Channel cross talk	< -65	dB	
Output power accuracy	0.1 <sup>a</sup> 0.2 <sup>b</sup>	dB	<sup>a</sup> attenuation 0-15 dB <sup>b</sup> attenuation 15-20 dB
Output power tuning resolution	0.1	dB	
Return loss	> 45	dB	
Control interface	RS232		
Feedback time for OPM	> 1	ms	via RS232
Optical fiber	SMF-28		
Operating temperature range	-5 to +65	°C	
Storage temperature	-40 to +90	°C	
External supply voltage	5 (±5%)	V	
Power consumption	< 60	mW	Per optical channel
Outer dimensions (L x W x H)	85.0 x 50.0 x 9.9	mm <sup>3</sup>	

Rev. 3.4

Subject to change without notice

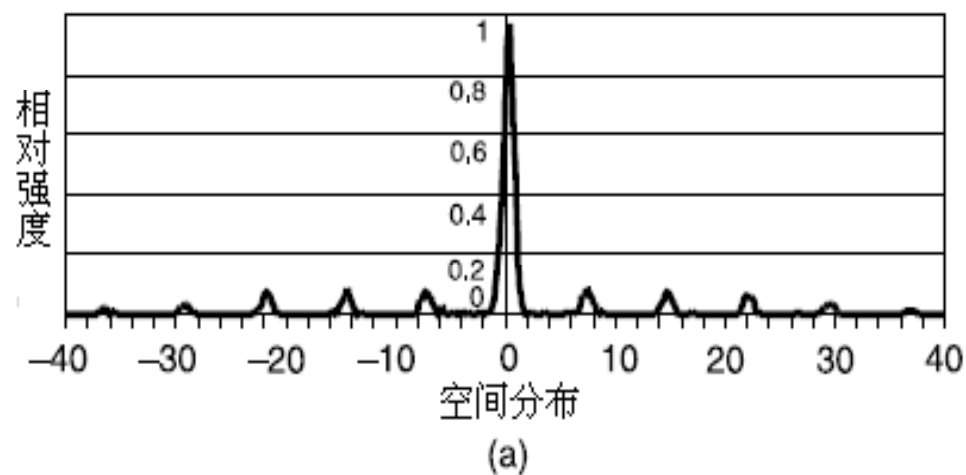
## Polymer Based VOA Principal



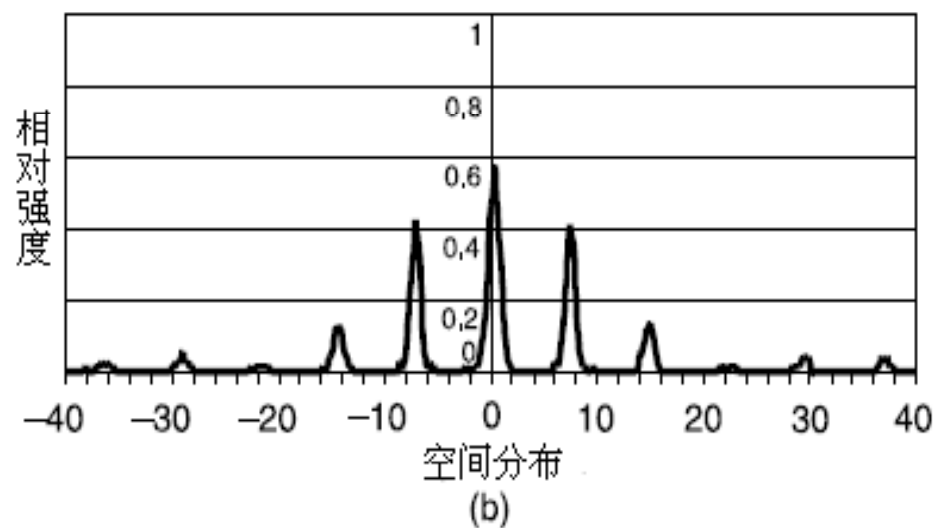
**Without Voltage**

**Voltage Applied**

## Theoretical Analysis Result

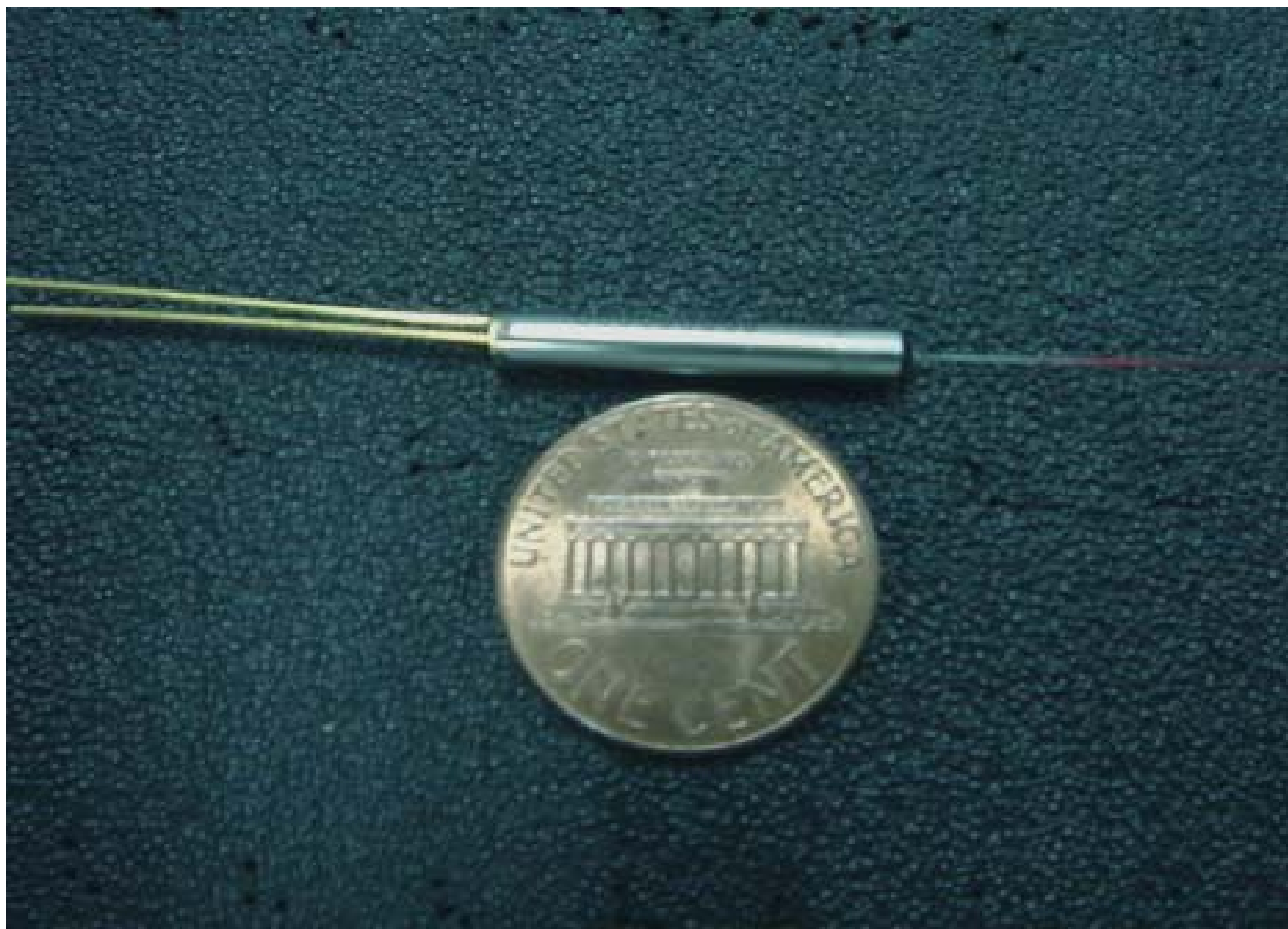


**Without Voltage**



**Voltage Applied**

# Mini-Tap-PD



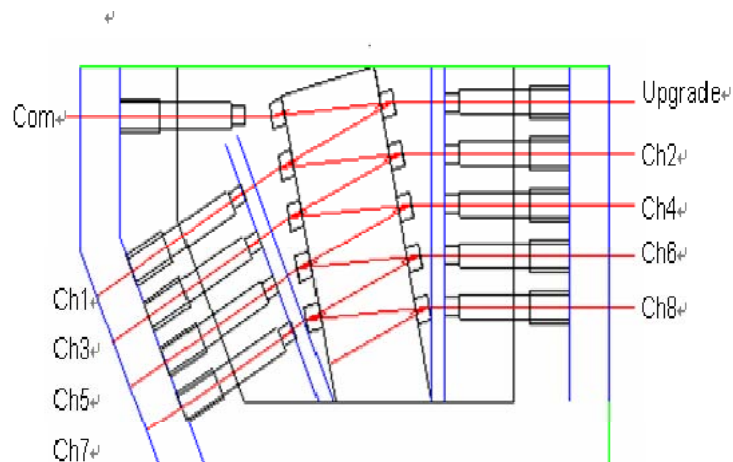
## Mini-Tap-PD Specification

Parameter	Unit	value				notes
Tap Ratio		1:99	5:95	10:90	25:75	
Insertion Loss	dB	<0.5	<0.6	<1.0	<1.7	Over full temperature range, Including WDL, TDL & PDL
Wavelength	nm	1510-1610				
Wavelength Dependent Loss(WDL)	dB	<0.3				
Temperature Dependent Loss (TDL )	dB	<0.2				Within Operating Temp.
PDL	dB	<0.1				0.03Typ.
Return Loss	dB	>45				
PD Responsivity	$\mu\text{A}/\text{mW}$	>8	>40	>80	>200	PIN respond to the input port
PD Dark Current	nA	<1				@5v Vr, 25°C
Capacitance	pF	<8				f=1MHz; Vr =5V
Bandwidth	MHz	300 ( typ).				RL=50 $\Omega$ , 5V, -3dB
Maximum Input Optical Power (PD)	dBm	21	16	14	12	
Maximum Reverse Voltage Vr	V	15				
Maximum Forward Current	mA	5				
Dimensions	mm	$\Phi 3.0 \times 20$				

# Mini-Tap-PD Array (Mini-OPDM)

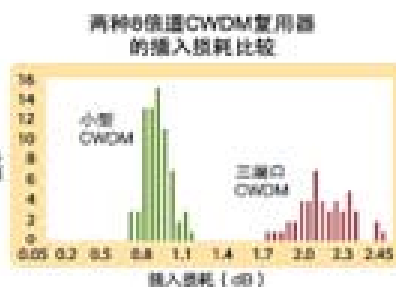


# New product: Mini CWDM Module



## Preliminary Specification

		4ch	8ch
wavelength		ITU	
Passband bandwidth (nm)	Min.	14	14
	Typ.	15	15
Passband flatness (dB)	Typ.		
	Max.	0.3	0.3
IL	Typ.	1	1.5
	Max.	1.5	2
Adjacent isolation (dB)	Min.	30	30
	Typ.		
Non-adjacent isolation (dB)	Min.	45	45
	Typ.		
RL (dB)	Min.	45	45
PDL (dB)	Max.	0.1	0.1
PMD (ps)	Max.	0.2	0.2
Upgrade channel (1260~1458nm)		1	1
Operating Temperature (°C)		-5~70	-5~70
Dimension (mm)		44*26*8	44*26*8





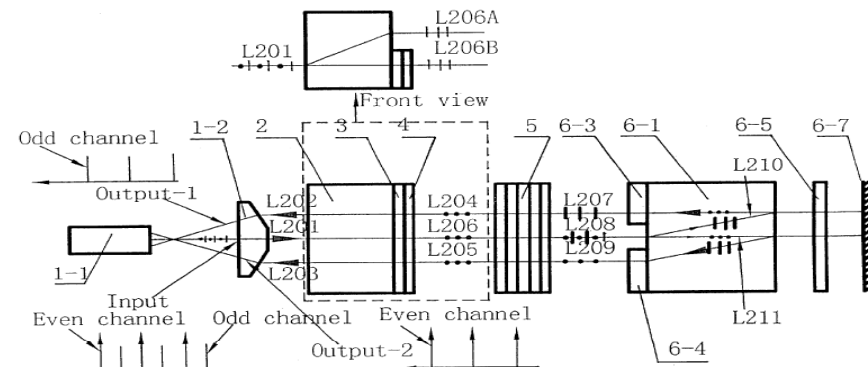
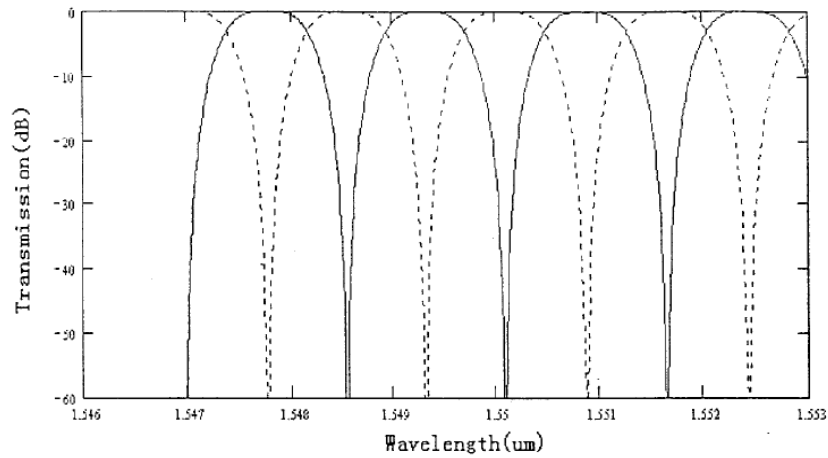
# Innovative Interleaver Design

U.S. Patent

Aug. 19, 2003

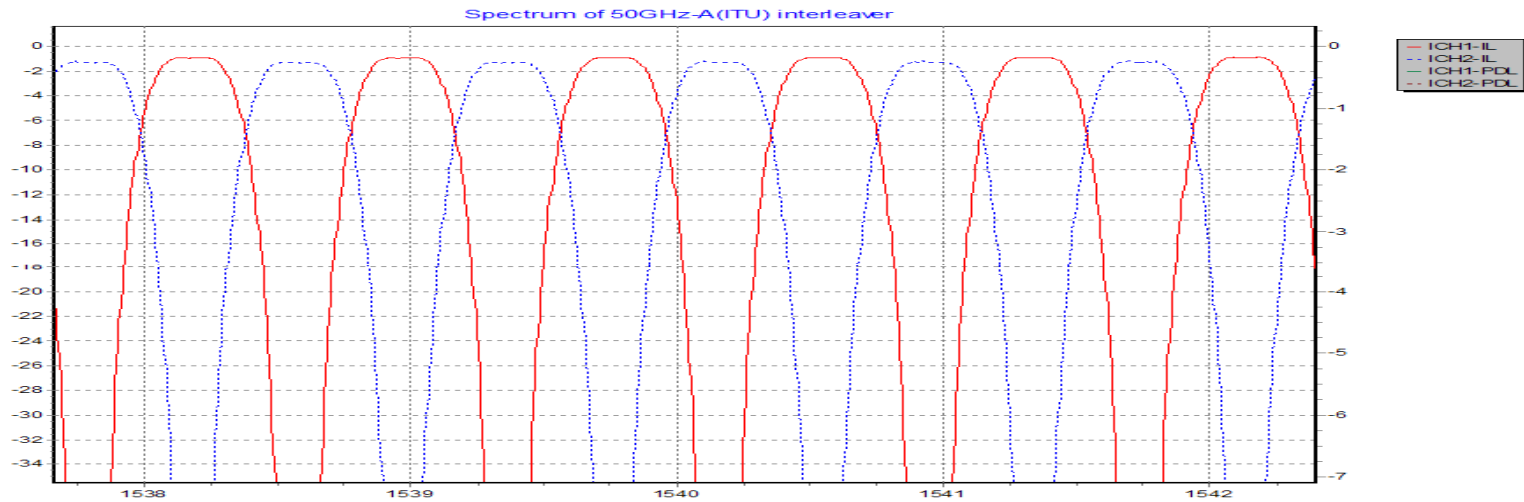
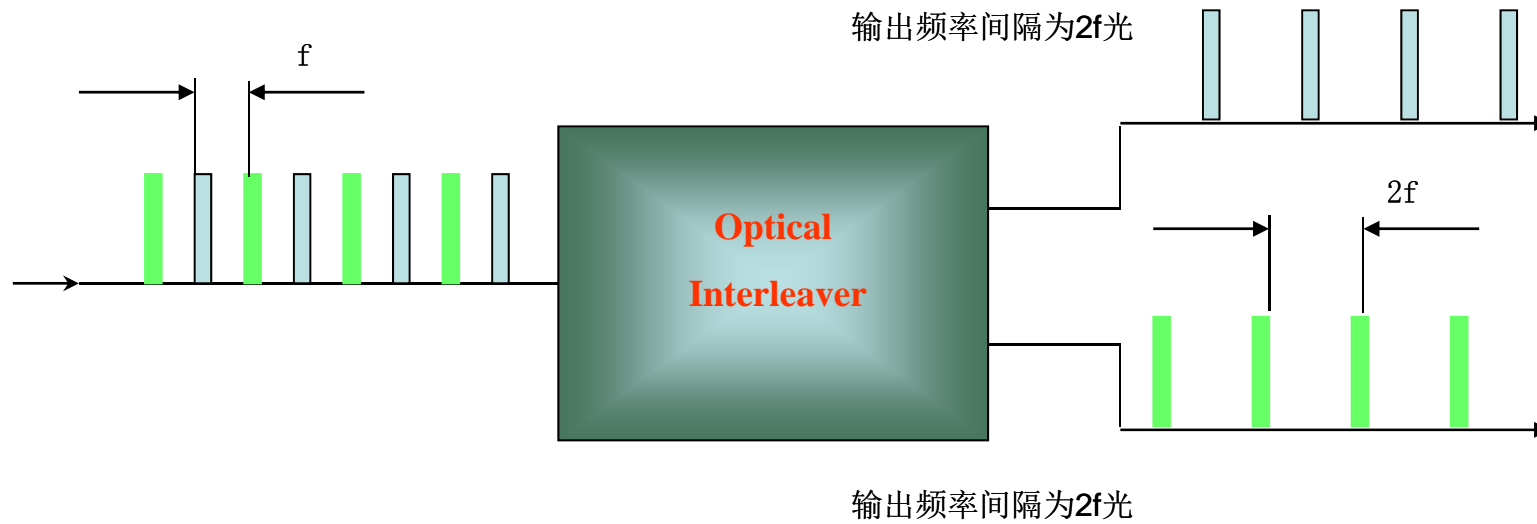
Sheet 9 of 9

US 6,608,719 B1

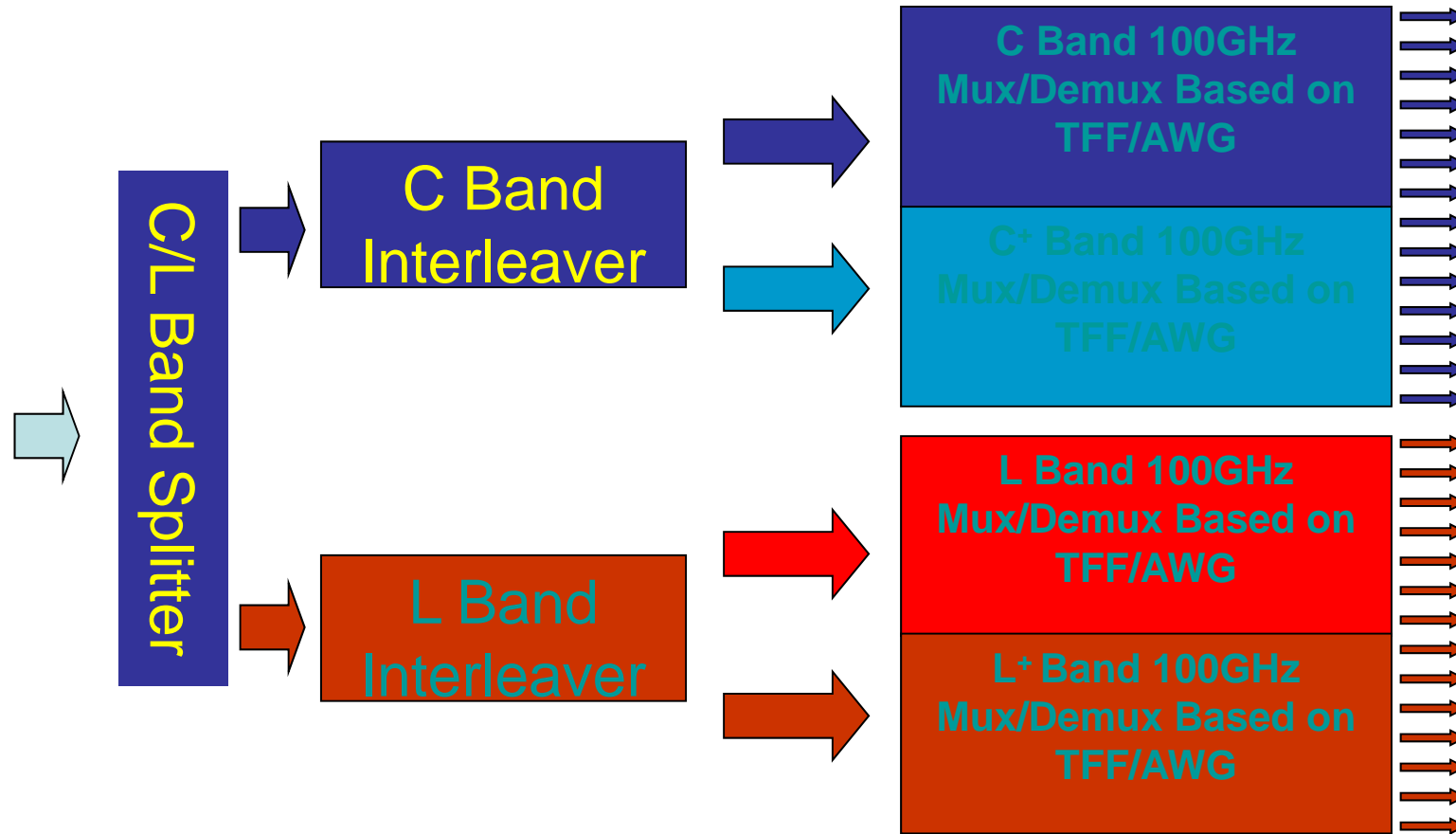


U.S. Patent Aug. 19, 2003 Sheet 5 of 9 US 6,608,719 B1

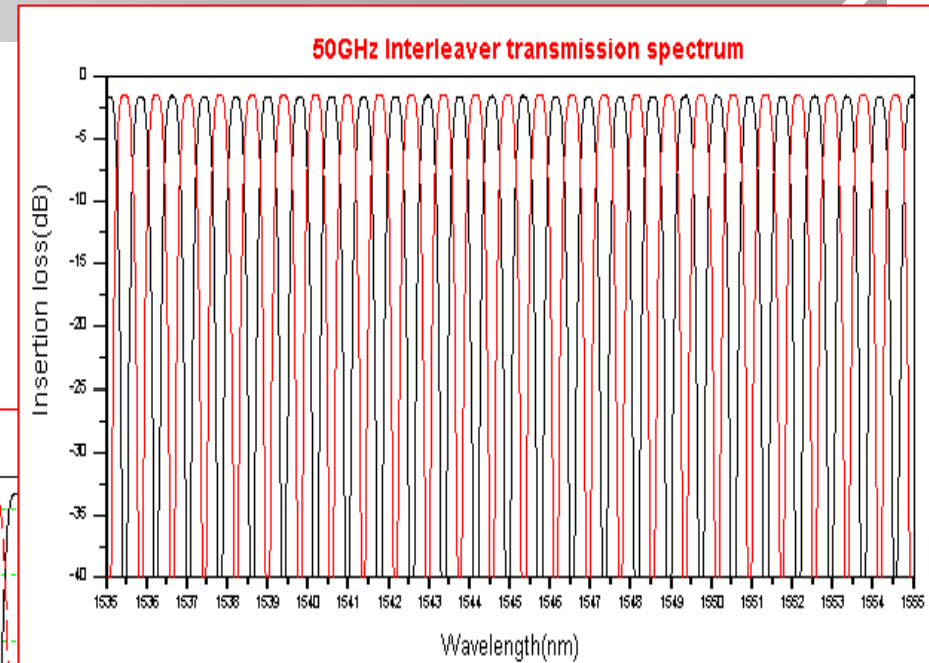
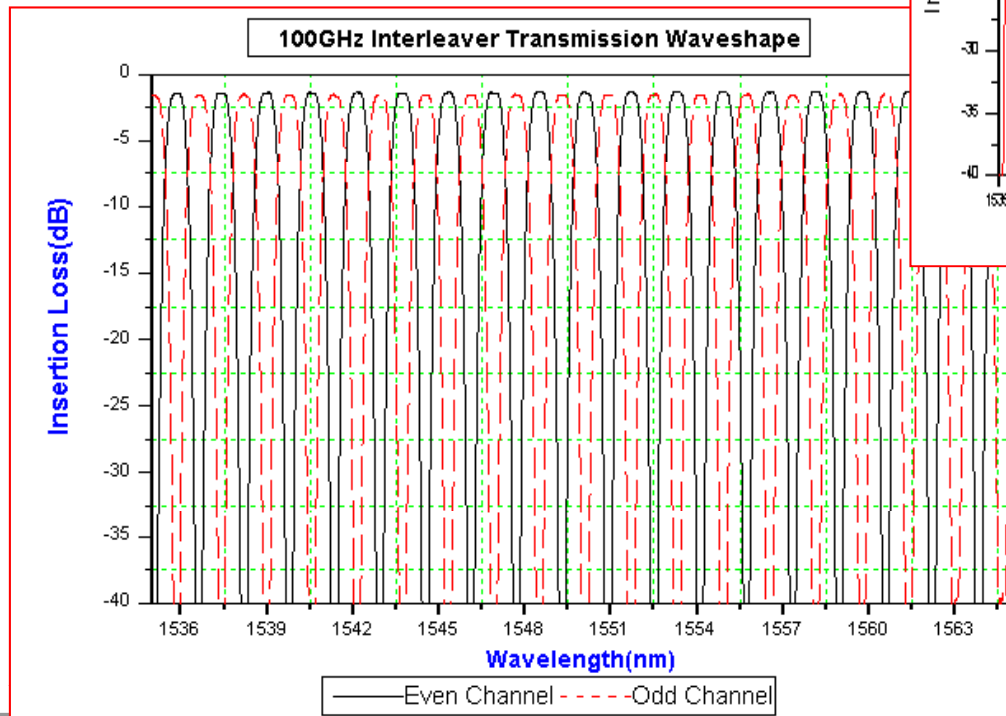
# Interleaver Function



# High performance 160 channels DWDM MUX/DWMUX



# Typical Transmission Spectra



Channel Spacing: 50GHz  
0.5dB passband: 0.19nm (~24GHz )  
Insertion Loss: <1.8dB  
Isolation with passband: >26dB  
PDL:<0.2dB  
Operating Temperature: 0~+60°C  
Telcordia GR-1221-CORE

# *Two Ports Tunable filters*



## Features

- Large dynamic range, cover S,C,L Bands
- High resolution for precise control
- Low insertion loss
- Fast response time
- Small footprint
- Low power consumption

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## Applications

- Tunable Optical Noise Filter
- Optical Amplifier(EDFA & Raman) Noise Filter
- Optical Performance Monitor
- Optical Fiber Sensor Detector

# Three Ports Tunable filters (Patent Pending)



## Features

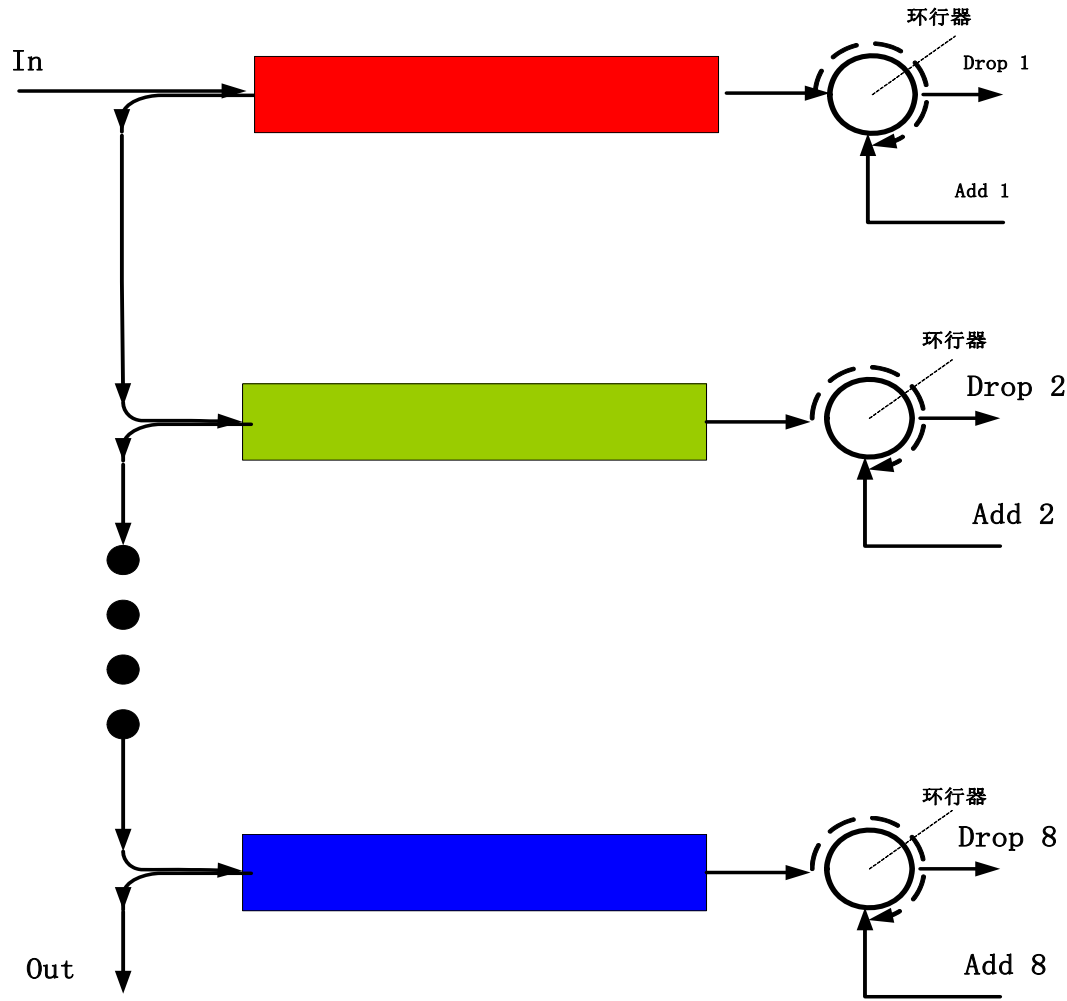
- **Wide tunable range ;**
- **Low insertion loss and Low PDL ;**
- **Low cost and compact size;**
- **Low power consumption and latched if power lost .**

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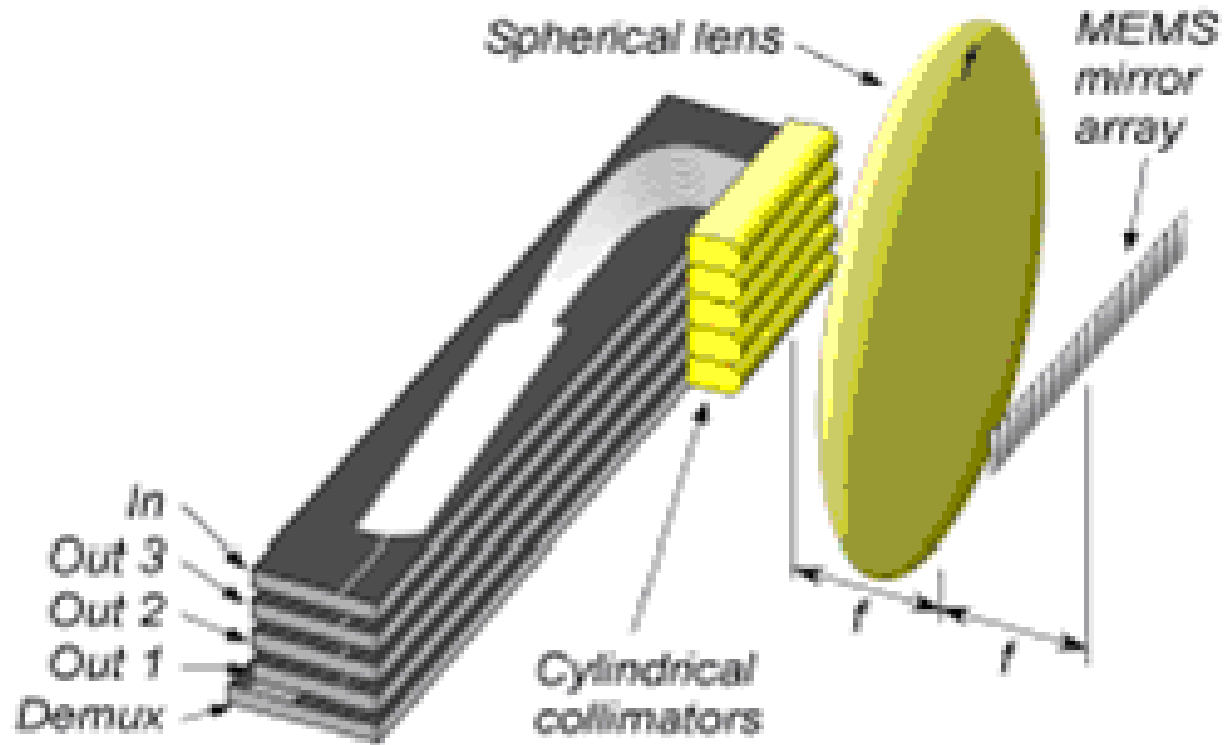
## Applications

- **ROADM (Reconfigurable Optical Add/Drop Multiplexer );**
- **Optical Performance Monitor;**
- **Optical Fiber Sensor Detector.**

*WSS Module based on Accelink Tunable Filter*  
(Patent Pending)

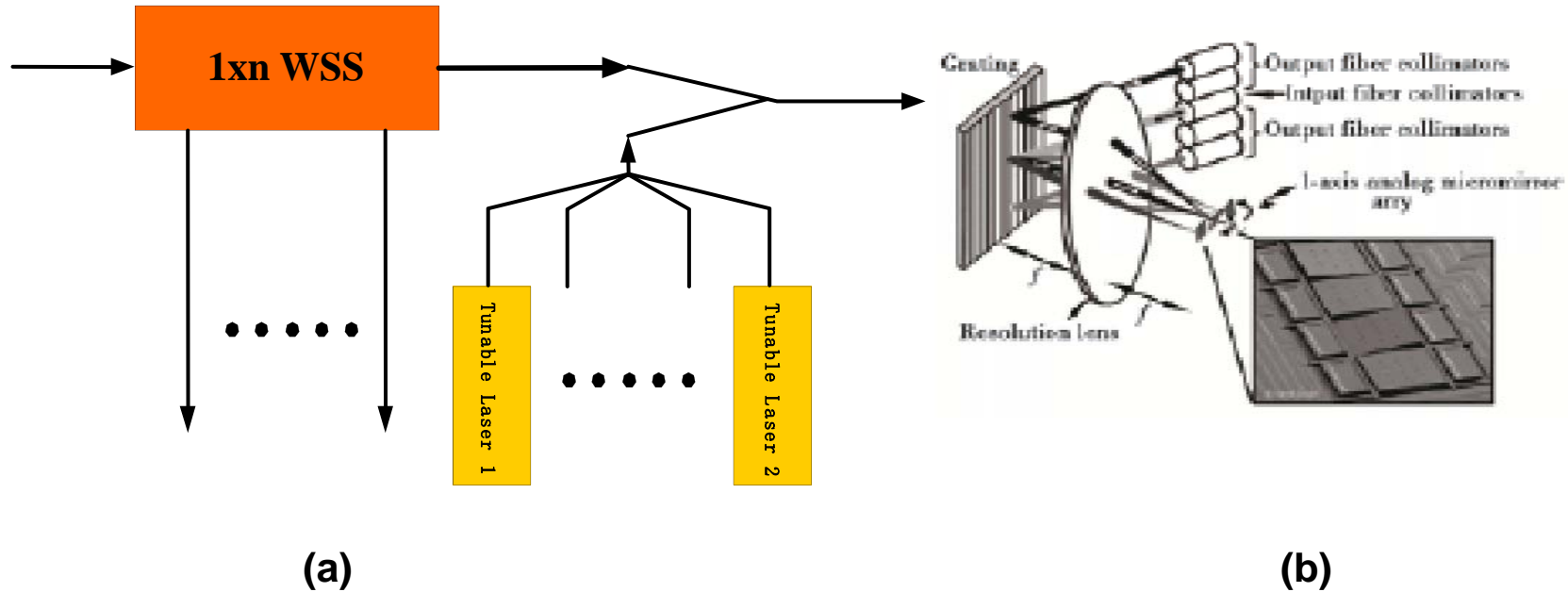


## *PLC and MEMS based WSS Module Solution*



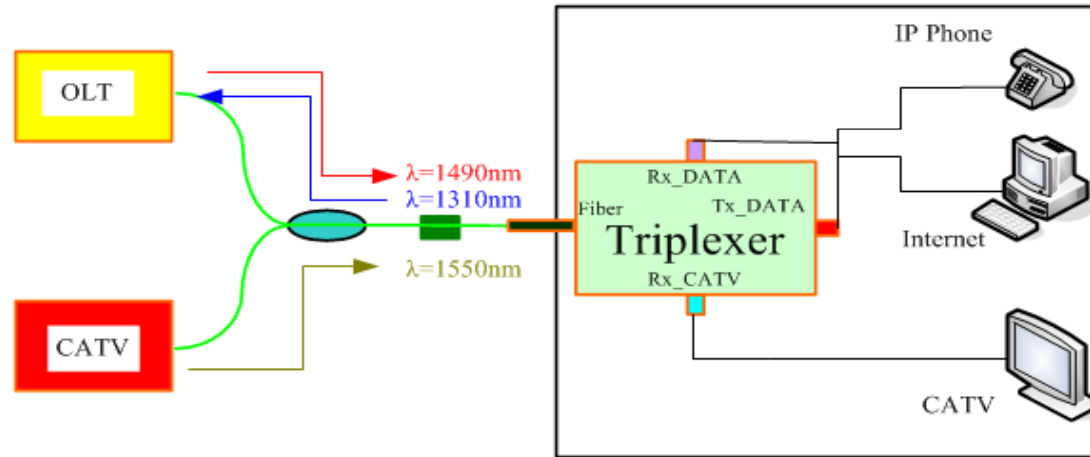
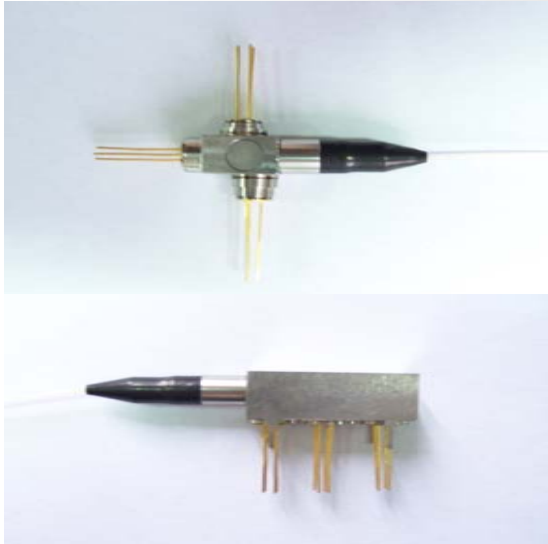


# WSS ROADM module



- (a) WSS (wavelength selective switch) ROADM
- (b) WSS structure

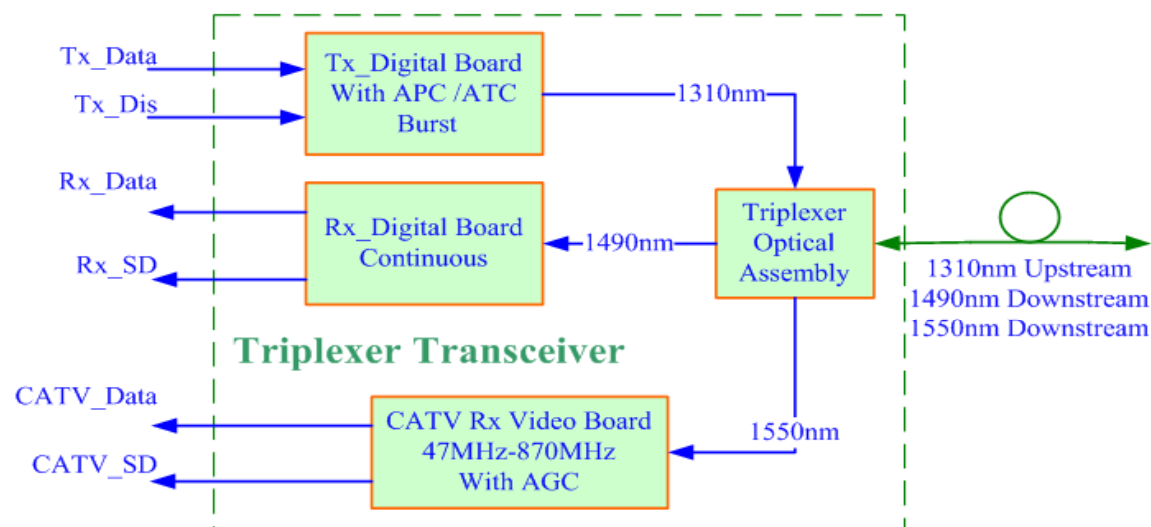
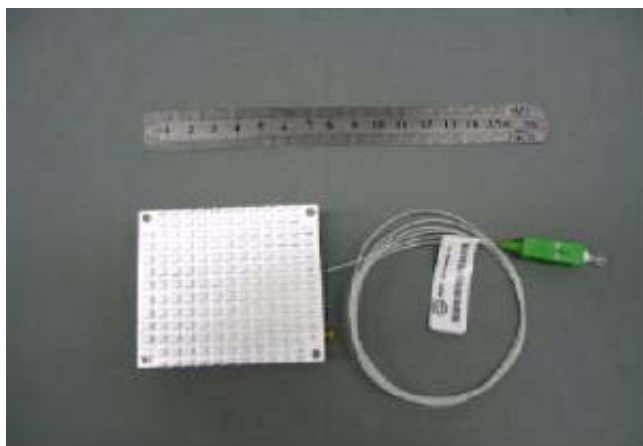
# *Triplexer for FTTX*



## **FEATURES**

- High reliability, Telcordia GR-468 qualified
- Integrated WDM filters for Tx/Rx1/Rx2 operation at 1310/1490/1555 nm
- 1.25 Gbps 1310nm FP laser diode emitter
- 1490 nm digital receiver integrated with 622Mbps, 3.3V TIA
- high linearity 1555nm photo diode as analog receiver
- 40~+85°C Operating temperature range

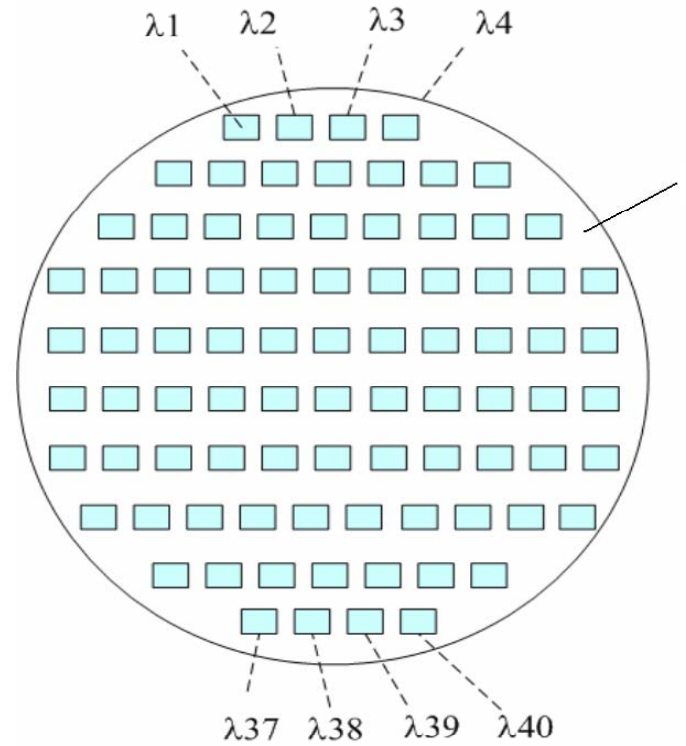
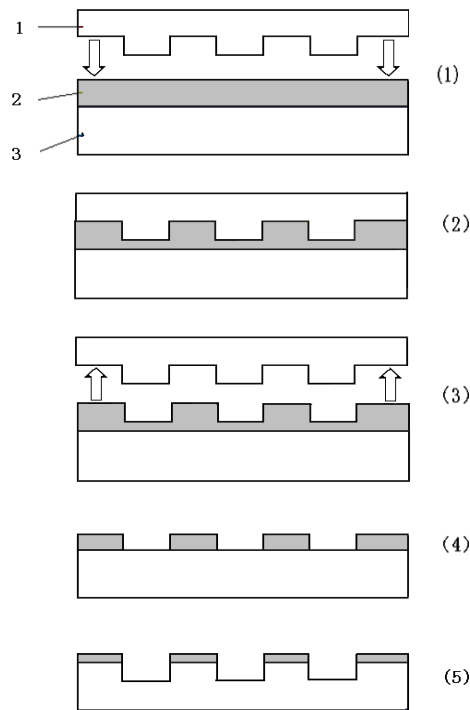
## *Triplexer Transceiver for EPON and GPON*



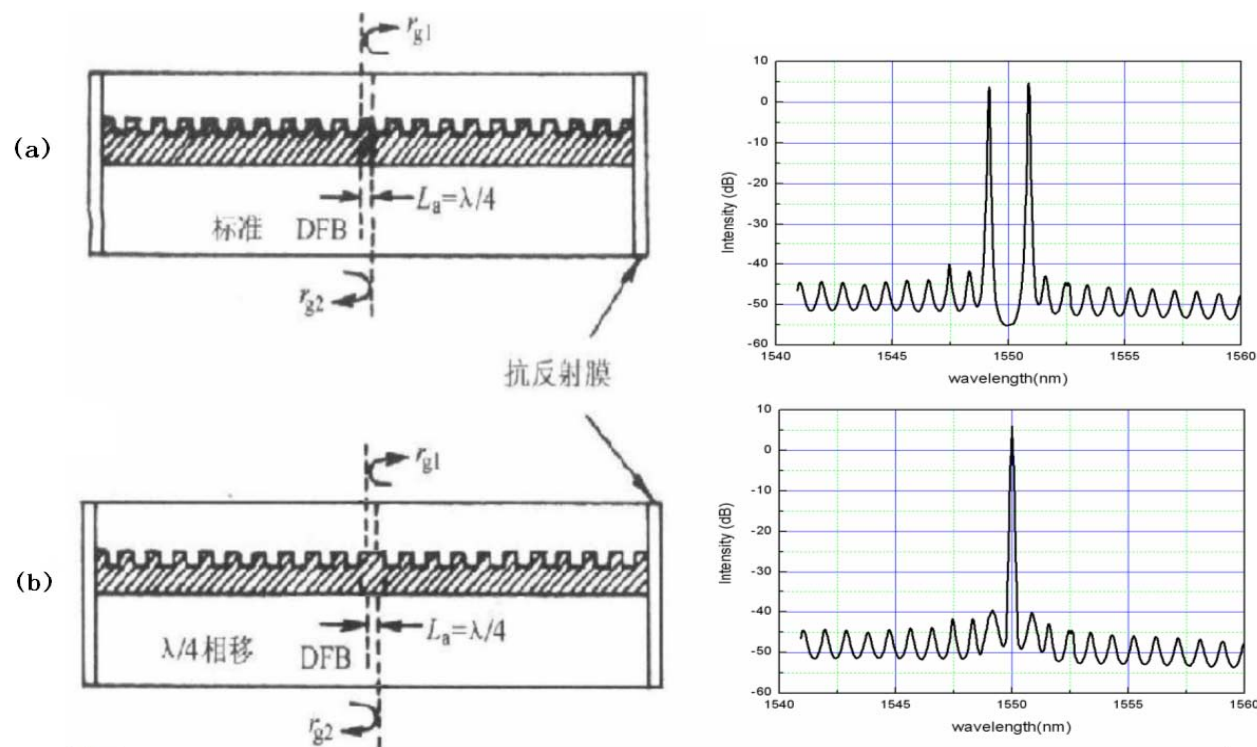
### **Main Feature:**

- 1310nm Tx ,1490nm Rx ,1550nm Video Rx
- 155Mbps/622Mbps, 1.25Gbps/1.25Gbps, etc..
- **Burst Mode Transmission, Continue Mode Receiver**
- 50~870MHz Video Bandwidth
- -20~+70°C Operation
- **Single Fiber Transceiver**
- **Compliant to FSAN G.983 Specifications**
- **Appliance on BPON, EPON, GPON, FTTH**

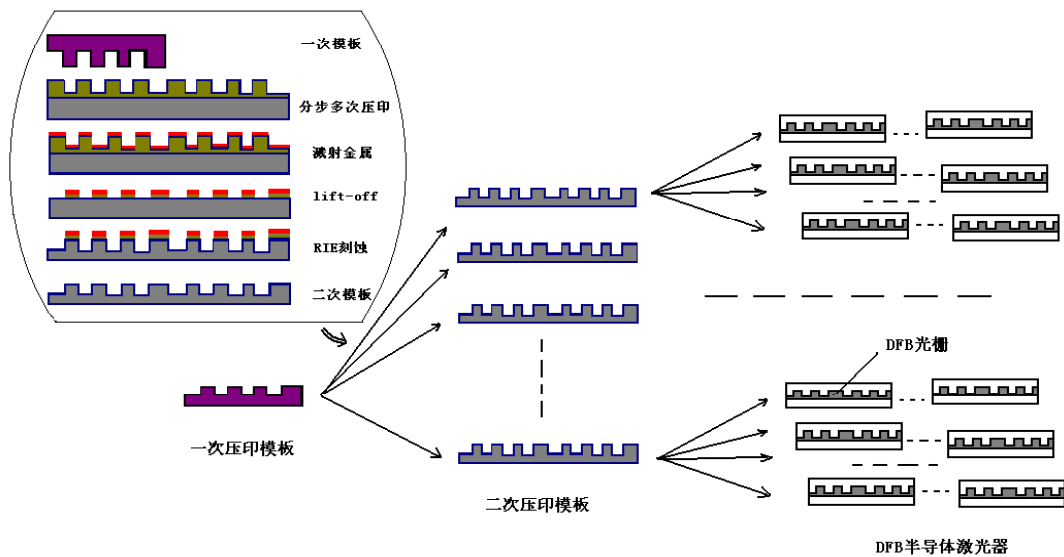
# DFB laser manufacture with nanoimprint technology



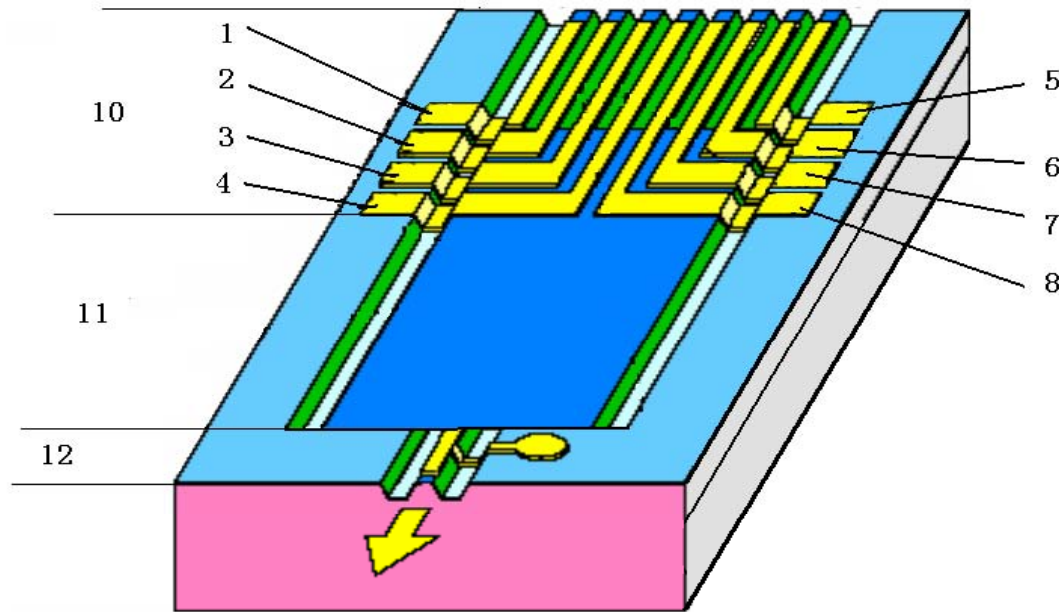
# Nanoimprint technology benefit for DFB Laser



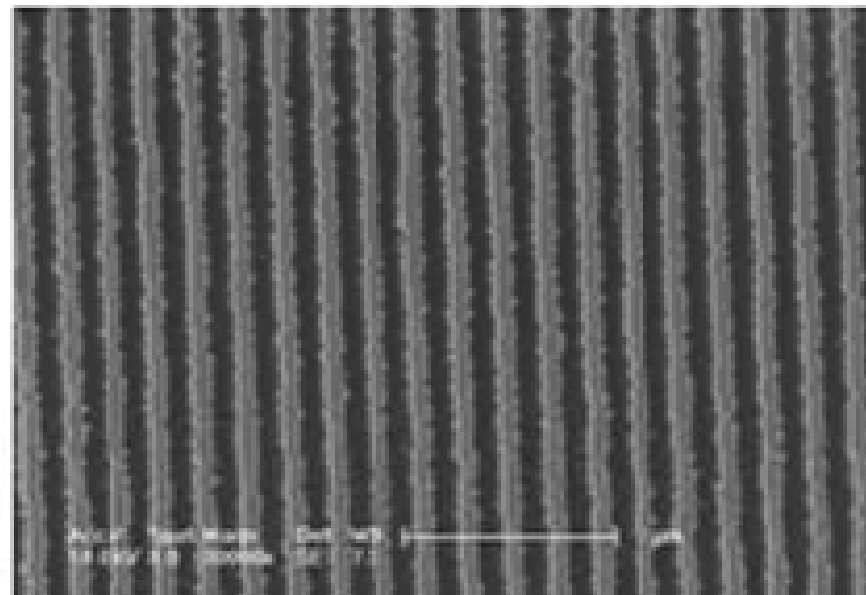
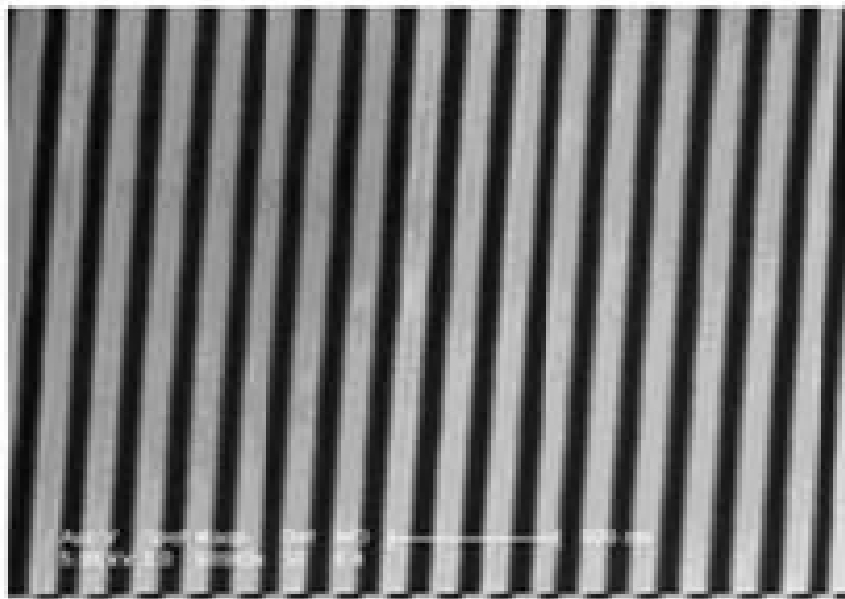
# Second hand mold for production



## DFB Laser Array and Tunable Laser



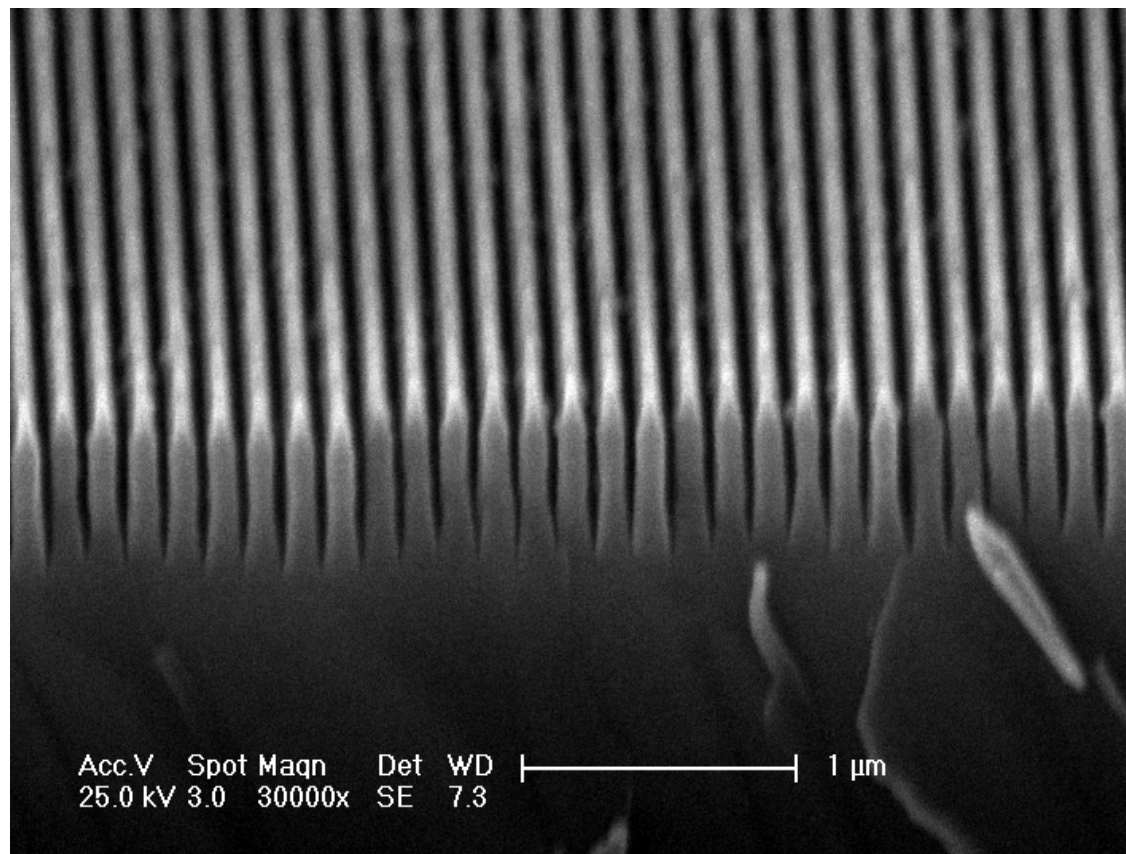
## A comparison Between Holography and Nanoimprint Process



采用压印和普通全息照相工艺制作的DFB

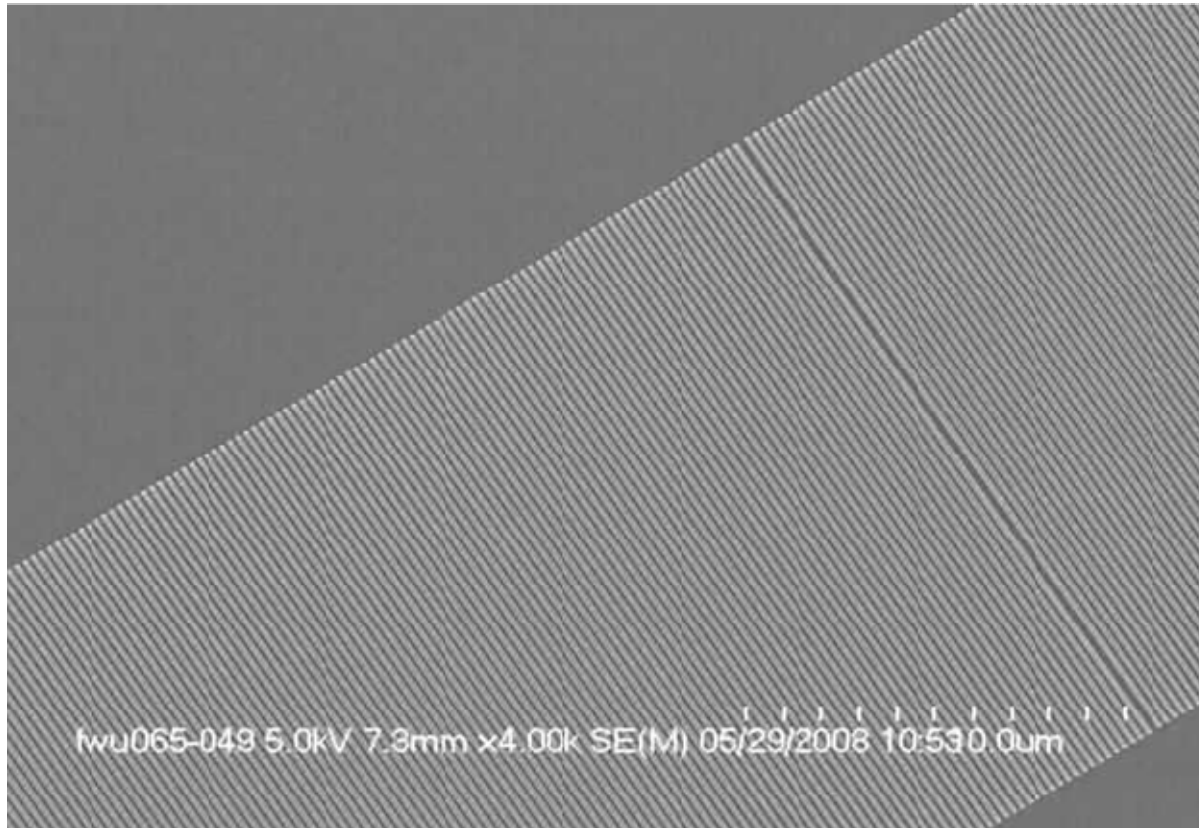


# Nanoimprint Mold for DFB

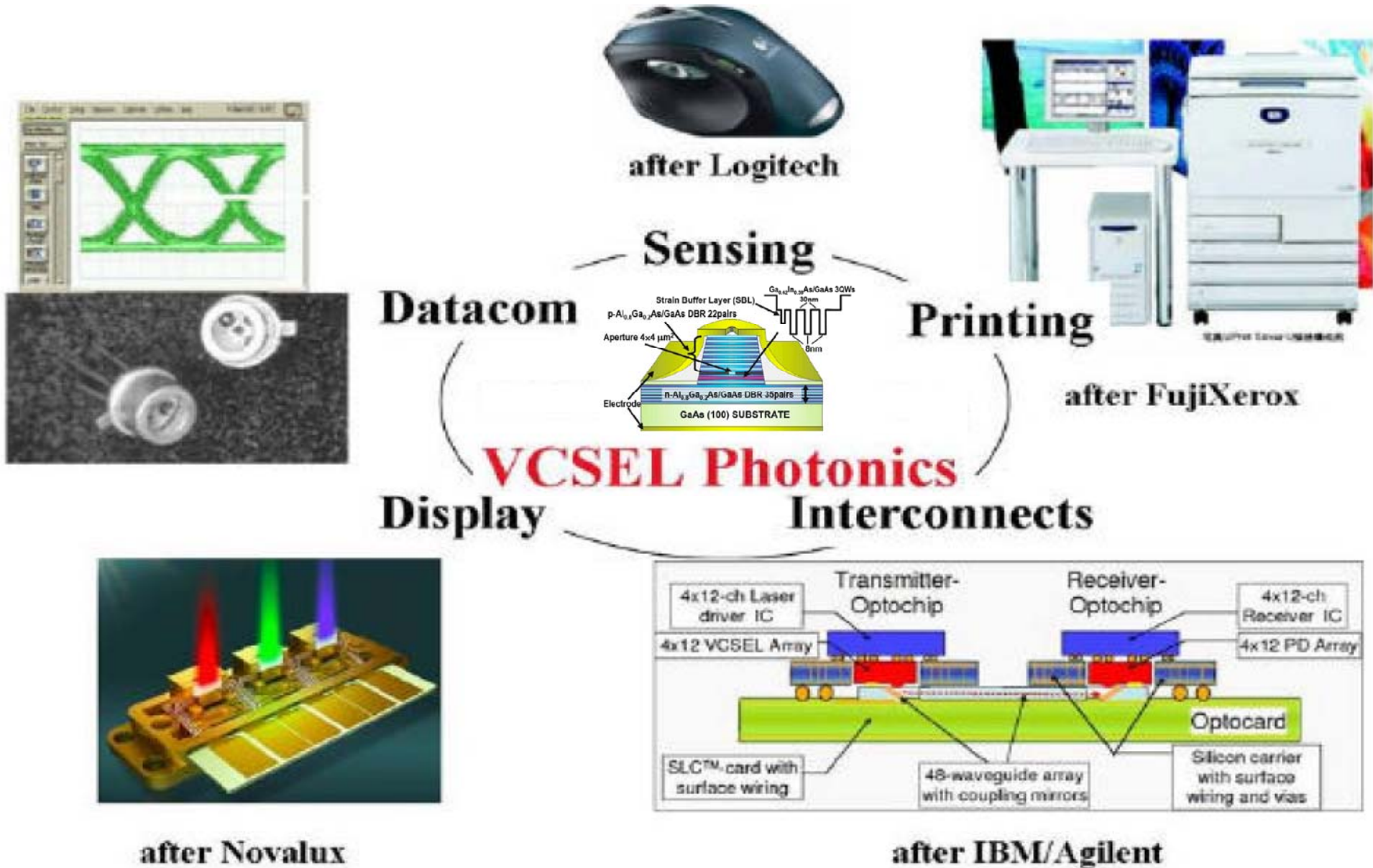


紫外热压印模板 (石英基片)

# DFB Mold With $\frac{1}{4}$ Wavelength Phase Shift

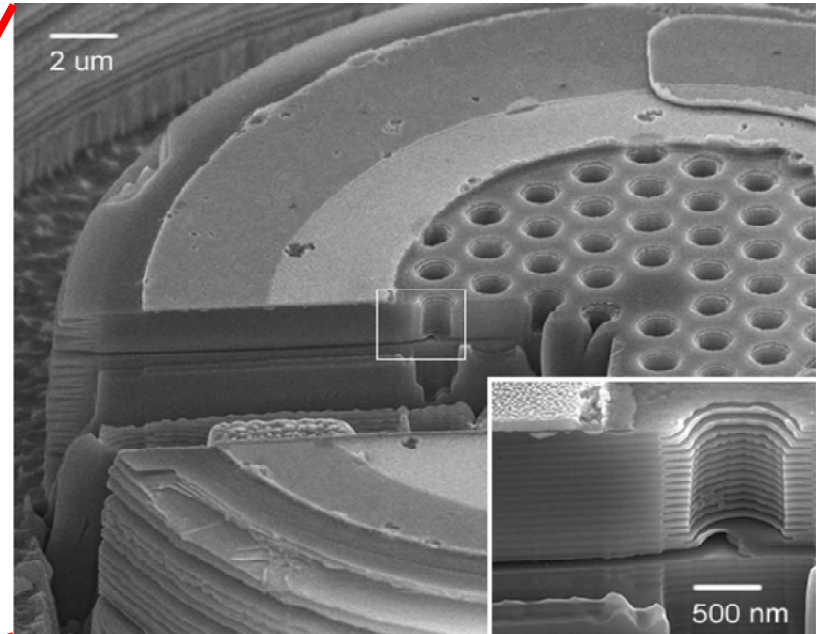


# VCSEL Laser Application



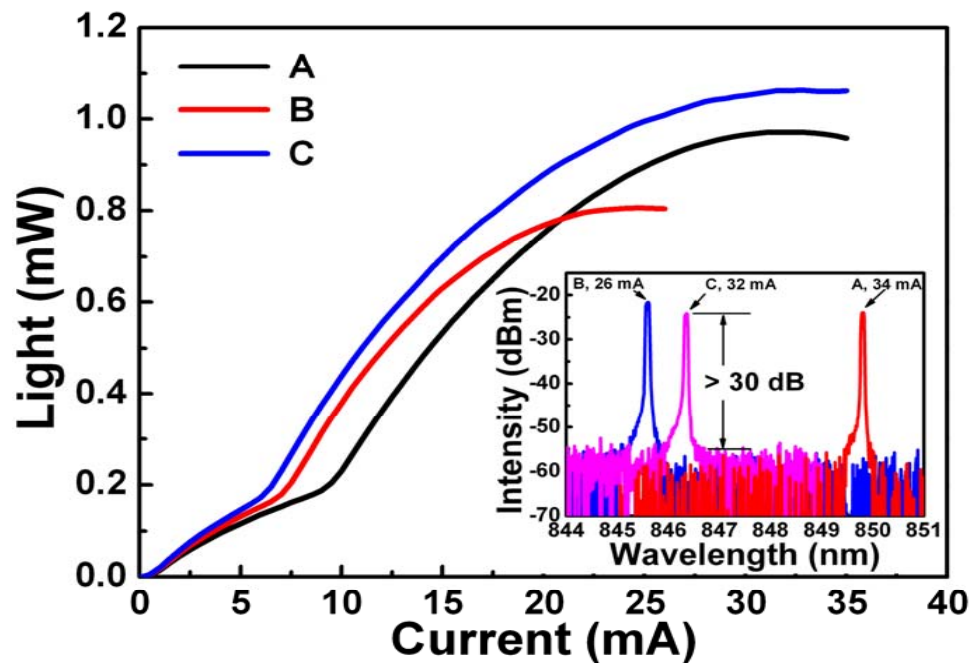
# Photonic Crystal VCSEL

- 1 缩小氧化孔径方法
- 2 注入和氧化结合结构
- 3 表面刻蚀结构
- 4 反波导结构
- 5 三角孔状结构
- 6 光子晶体结构  
(PC-VCSEL)**

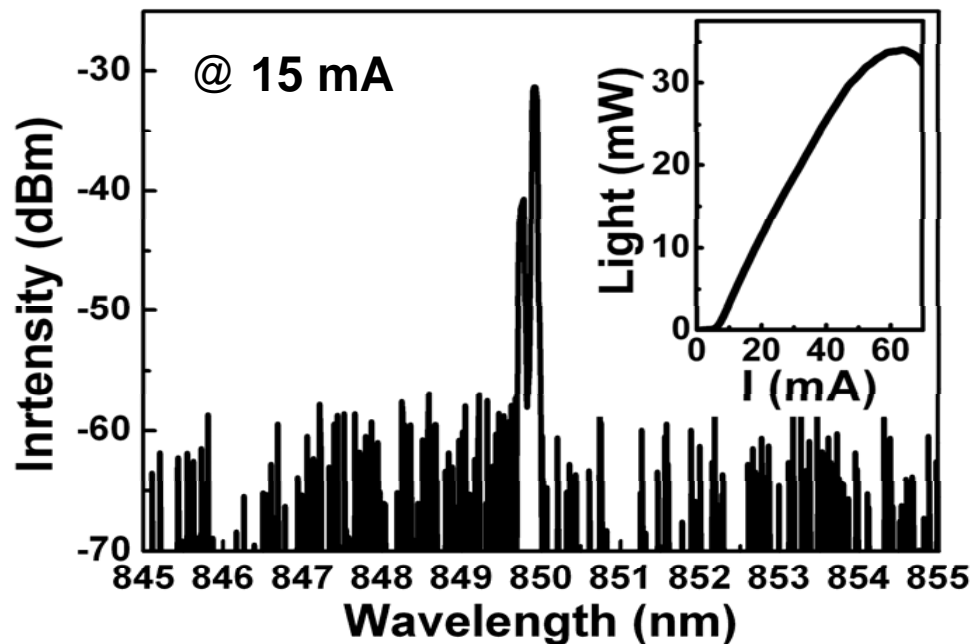


PC-VCSEL的SEM图

**PC-VCSEL**设计空间大，设计和制作容差大，可重复性高，受到广泛研究



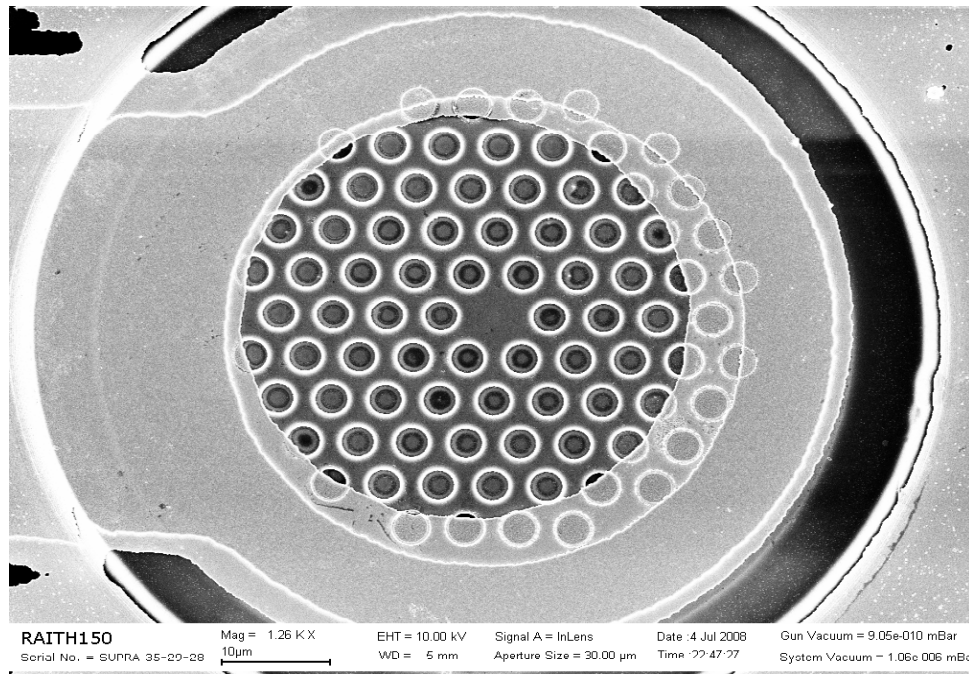
PC-VCSEL



没有光子晶体结构的VCSEL

**PC-VCSEL单模激射，边模抑制比大于30 dB**

# PC-VCSEL Realized By EBL



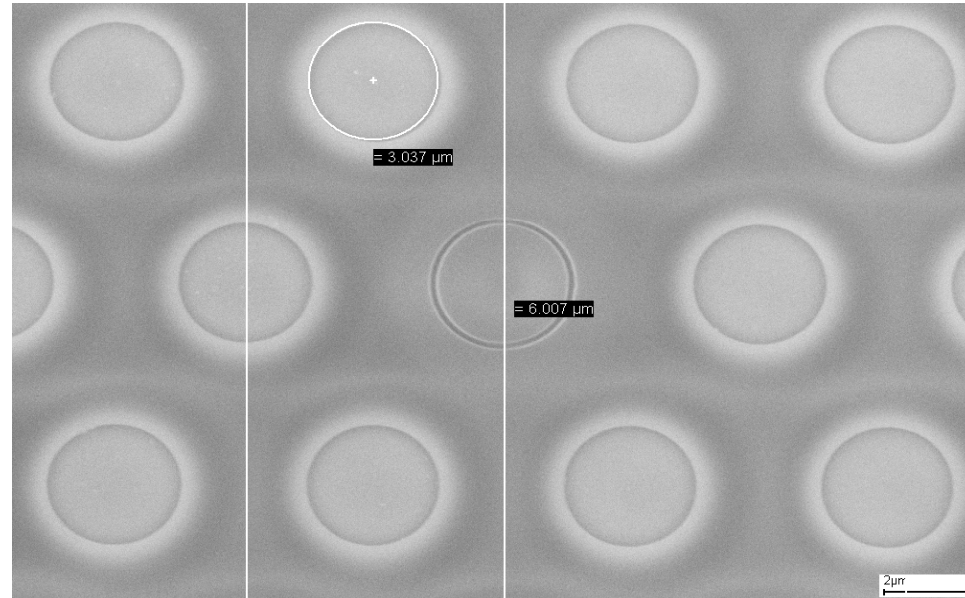
SEM图



激光近场图

目前世界上都采用**EBL**制作**PC-VCSEL**，  
成本昂贵，产能低下，不适合大规模生产

# PC-VCSEL Realized By NanoImprint



PC-VCSEL MOLD SEM图

# Summary

- Fiberhome(WRI) is a leading OC suppliers in China**
- Broad product portfolio which covers most optical components, modules and integrated optical subsystems for optical fiber communication**
- High volume manufacture capacity permits low cost and on time delivery**
- Healthy financial status**
- Intensive cooperation experiences with level one customers**
- In Fiberhome(WRI), innovative design and new technology play more and more important roles except the low labor cost and the processing control**



# Future: Manufacture/Accelink Park(Planning)

**Keep increasing production capacity continuously**



Over 50,000 square meter of manufacturing facilities, including state-of-art class 100 and 1,000 clean room.

# Welcome to visit us in Wuhan!

