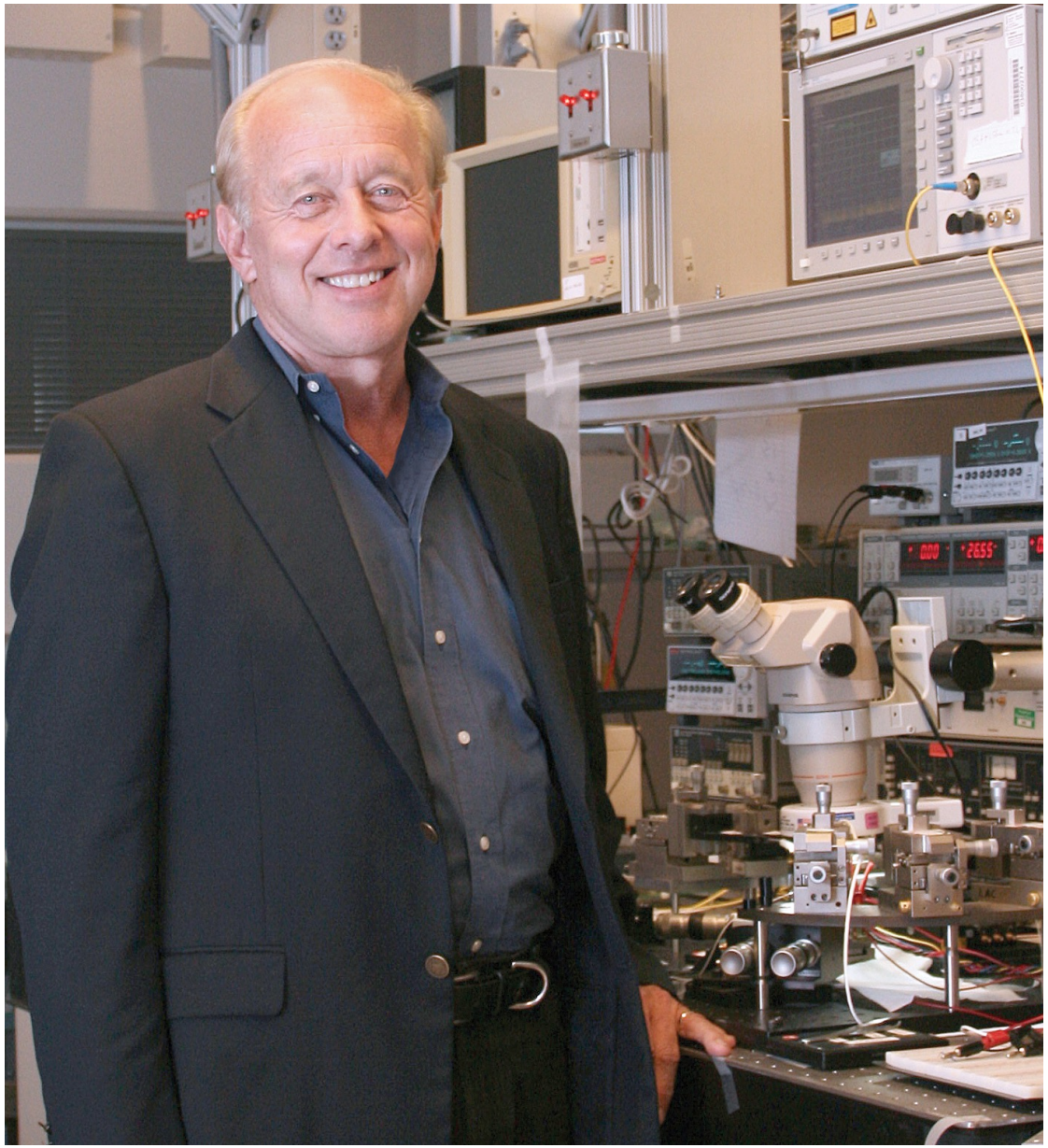
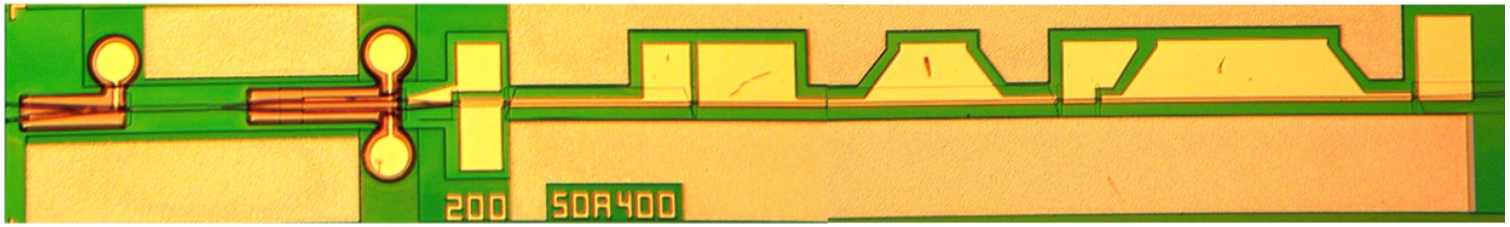
Larry Coldren



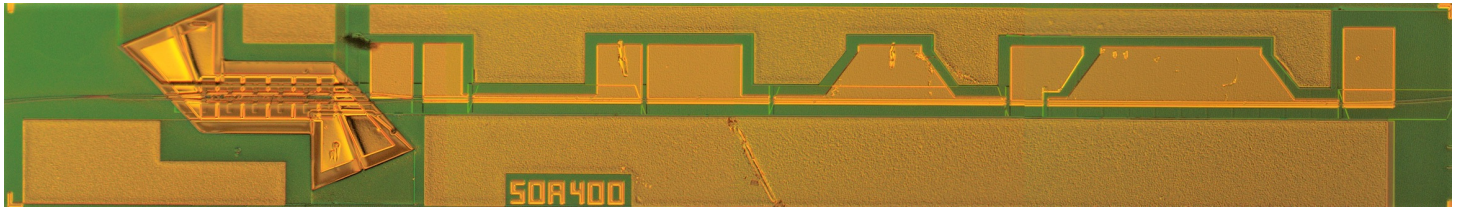
Chip Photos (UCSB)

SGDBR/PICs:

Basic 4-Section SGDBR ‘93-’97



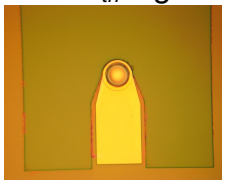
Integrated SGDBR-PD/SOA/MZI with data and data out 2000-2004



Integrated SGDBR-PD/SOA/TW-MZI 2002-2005

VCSELs:

Lowest J_{th}/highest P_o

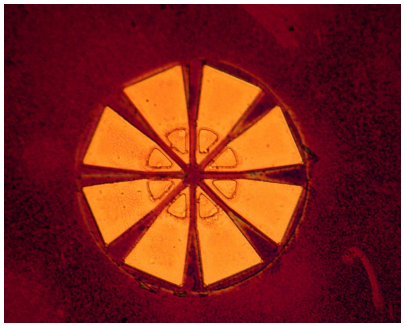


Planarized pillar ’89-’94

1st strained @ 850 nm

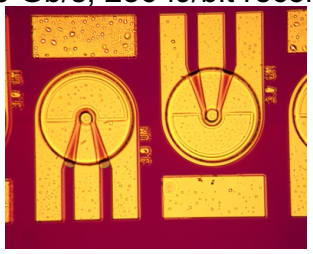
Strained AlInGaAs QWs ‘95-’98

8 λ into 50 μm fiber core



Compact CWDM arrays ‘97-’99

35 Gb/s, 286 fJ/bit record



Efficient, high-speed Designs ‘06-’12

Widely-Tunable DBR Lasers +

United States Patent [19]
Coldren

[11] **Patent Number: 4,896,325**
[45] **Date of Patent: Jan. 23, 1990**

[54] **MULTI-SECTION TUNABLE LASER WITH DIFFERING MULTI-ELEMENT MIRRORS**
[75] Inventor: **Larry A. Coldren**, Santa Barbara, Calif.
[73] Assignee: **The Regents of the University of California**, Berkeley, Calif.
[21] Appl. No.: **235,307**
[22] Filed: **Aug. 23, 1988**

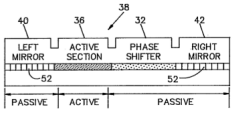


FIG. 5

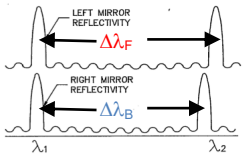
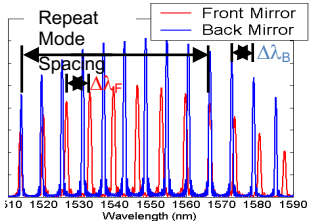
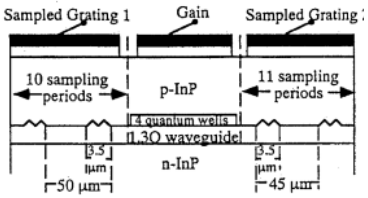


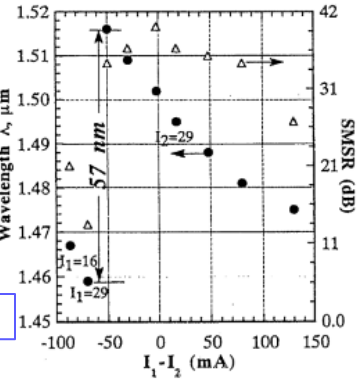
FIG. 7



Vernier wavelength tuning

3-section Sampled-Grating DBR

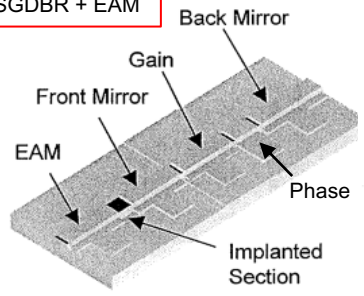


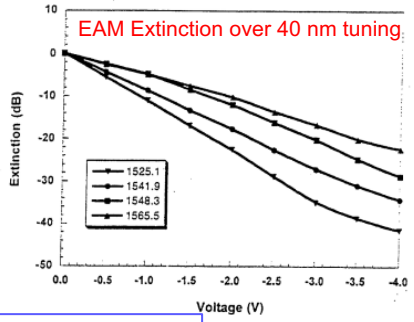


V.Jayaraman, et al, *ISLC,* PD-11, Sept 1992

Theory & Design: V. Jayaraman, et al, *JQE*, **29** (6) June 1993

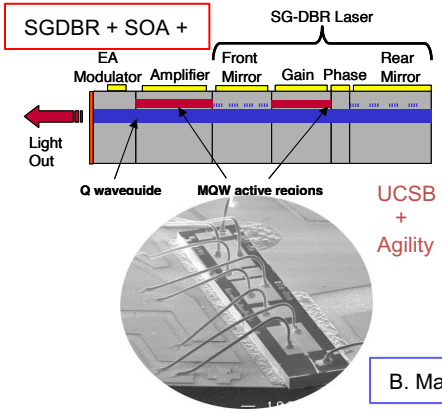
SGDBR + EAM



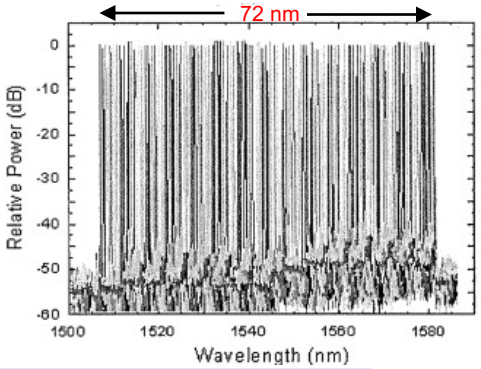


B. Mason, et al, *IPR*, paper RME2, July 1999

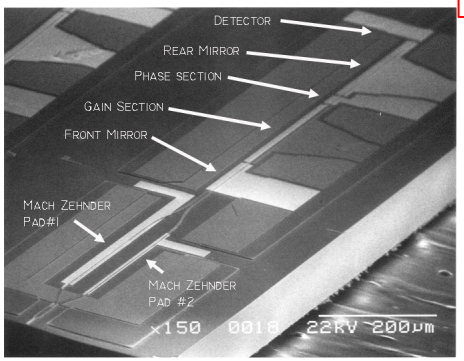
SGDBR + SOA +



UCSB + Agility

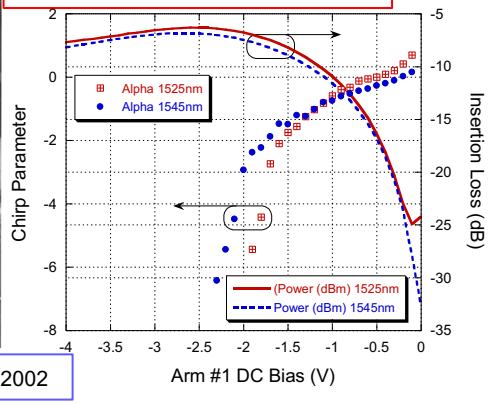


B. Mason, et al, *OFC*, pap TuL6, Mar. 2000



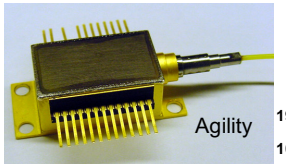
J. S. Barton, et al, *ISLC*, paper TuB3, Sept 2002

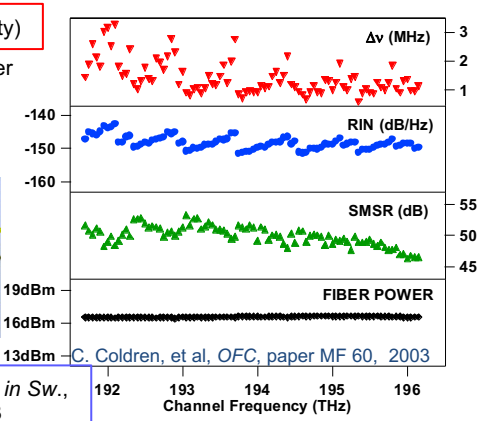
SGDBR + MZ → Chirp management



Packaged SGDBR (Agility)

P_o > 40 mW in fiber
$\Delta\lambda$ > 40 nm
SMSR > 45 dB
MTTF ~ 350 yrs





C. Coldren, et al, *OFC*, paper MF 60, 2003

J. Regan, et al, *Photonics in Sw.*, pap PS.Mo.A1, Sept 2003

VCSELs

Conference on Lasers and Electro-Optics, Anaheim, CA 1988

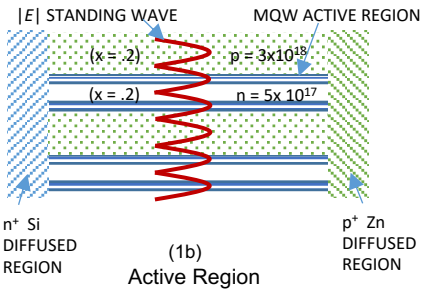
WM1 Analysis and design of a novel parallel-driven MQW-DBR surface-emitting diode laser

R. GEELS, R. H. YAN, J. W. SCOTT, S. W. CORZINE, R. J. SIMES, LARRY A. COLDREN, UC–Santa Barbara, Electrical & Computer Engineering Dept., Santa Barbara, CA 93106.

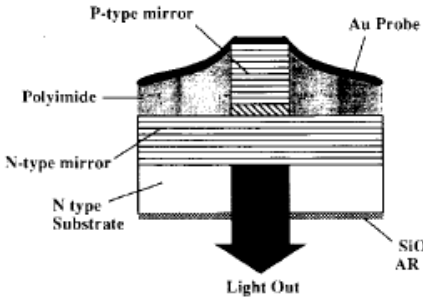
...

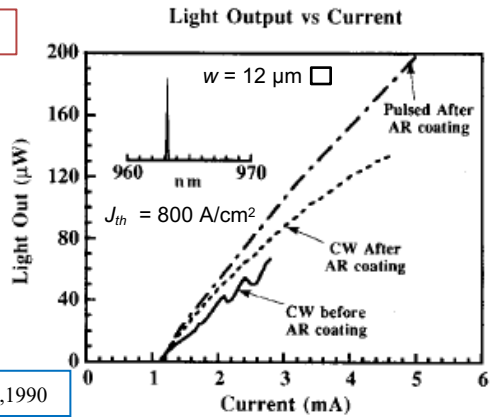
Several significant features of our design are indicated in Fig. 1(b). The MQW-undoped active regions are placed at maxima of the cavity standing-wave pattern, and the lossy highly doped regions are centered on standing-wave nulls. This, together with the fact that the entire lateral mode width crosses the MQW active regions, results in a much higher net confinement factor (~0.2) than in

First publication of modal gain enhancement with gain elements only on |*E*| maxima



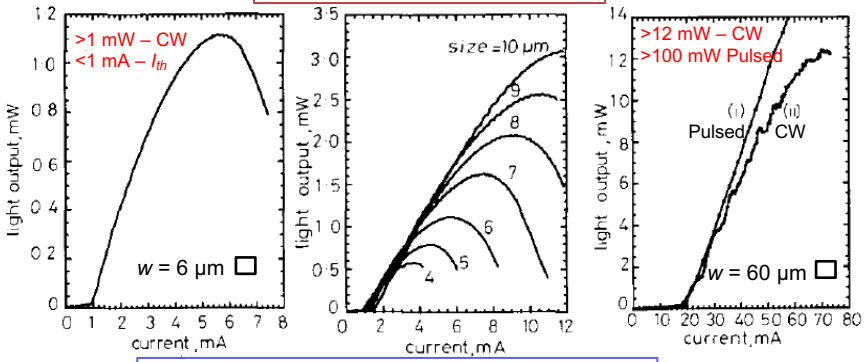
First J_{th} < 1kA/cm²



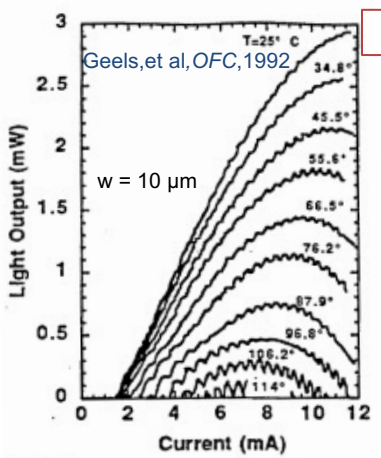


R. Geels, et al, *OFC*, PD31-1, Jan,1990

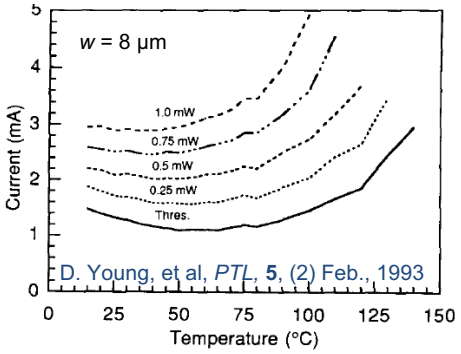
First practical powers/thresholds



R. Geels, et al, *Electron. Letts.*, **27** (21) Oct., 1991

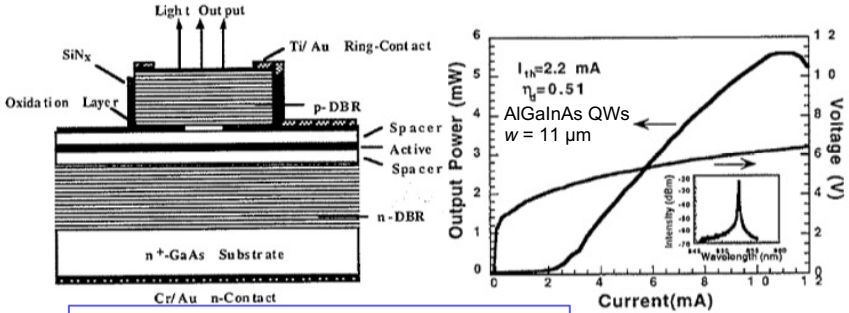


First offset gain to improve Temp performance



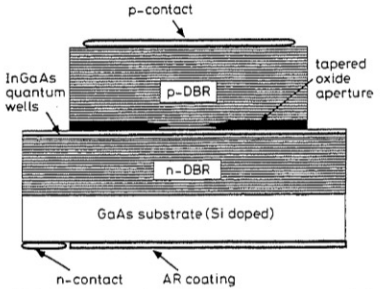
D. Young, et al, *PTL*, **5**, (2) Feb., 1993

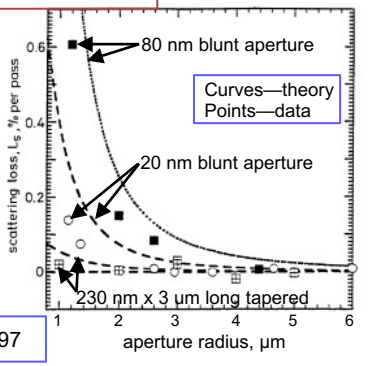
First highly-strained Active @ 850 nm



J. Ko, et al, *IEEE LEOS*, pap TuDD3, Nov, 1996

First demonstration of lowest-optical loss tapered apertures





E. Hegblom, et al, *Electron Letts*, **33** (10), May 1997