ETUDE DES LASERS III-V SUR SILICIUM COHÉRENTS ET À MODULATION DIRECTE POUR LES TRANSMISSIONS OPTIQUES RAPIDES.

Auteurs

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CONTEXTE

PLATEFORME PHOTONIQUE SUR SILICIUM

1. Faible coût
2. Haute densité d'intégration
3. Compatibilité avec les technologies CMOS
4. Transparence aux longueurs d'onde des communications optiques (1,3 µm/1,5 µm)

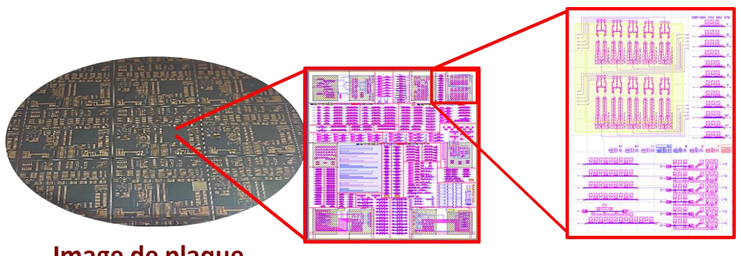
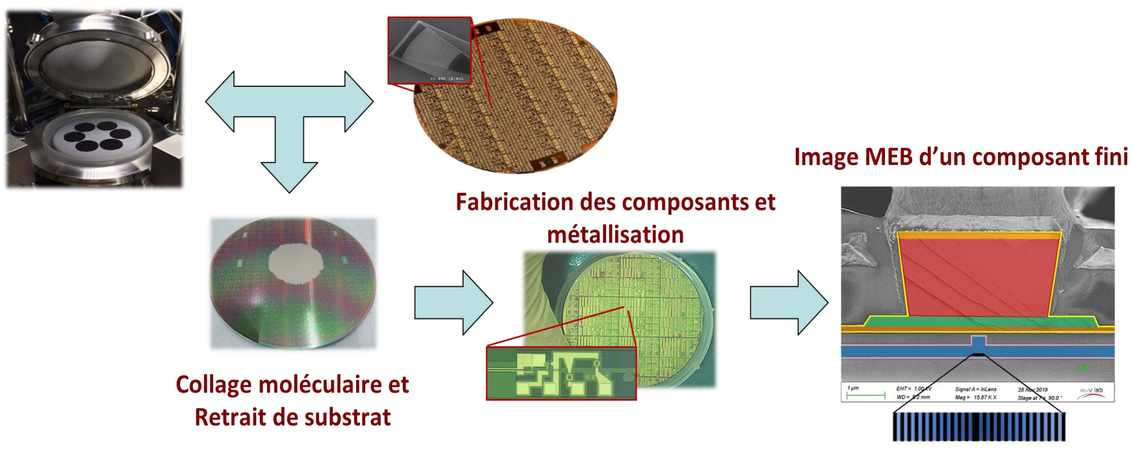


Image de plaque — Masque d'une cellule

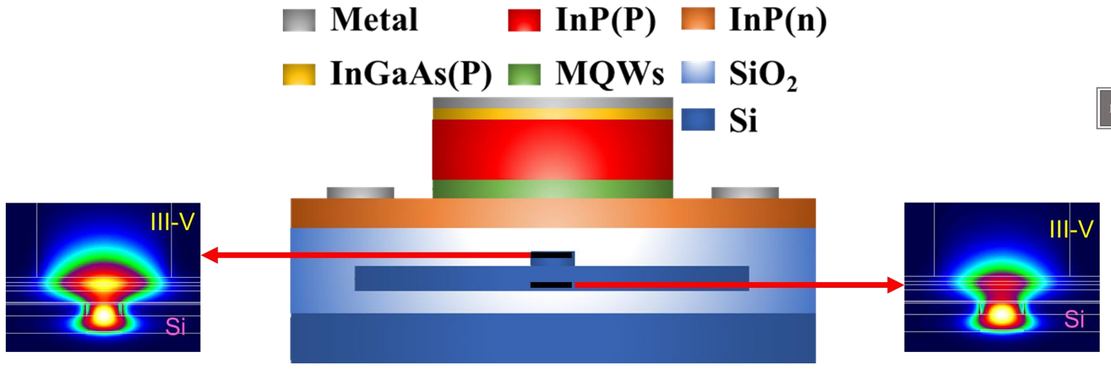
PROCESSUS DE FABRICATION



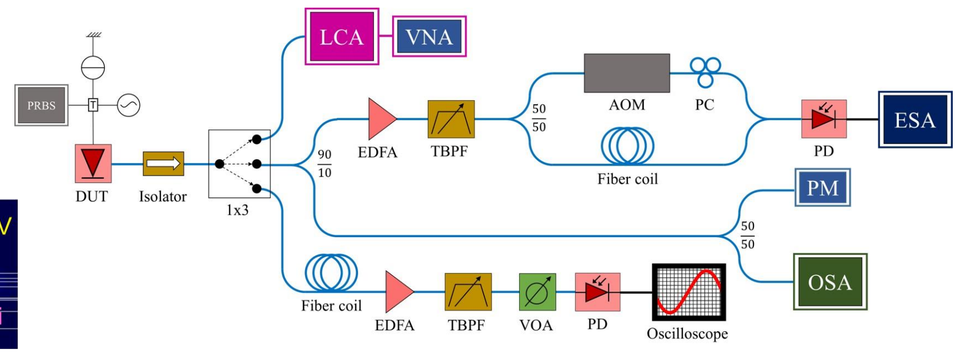
ETUDES DU COMPOSANT

CONCEPTION ET DESIGN

Coupe transversale de lasers DFB III-V-sur-Si et Simulations de la distribution du mode optique 2D

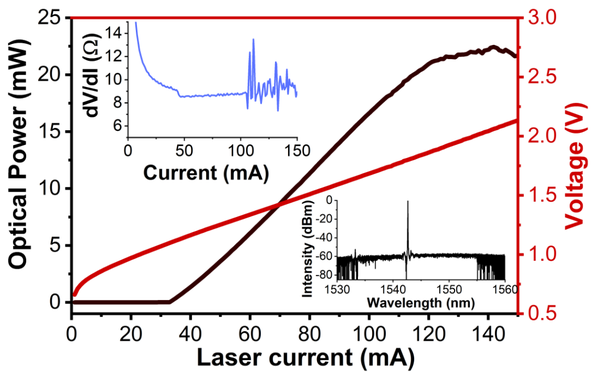


Montage expérimental

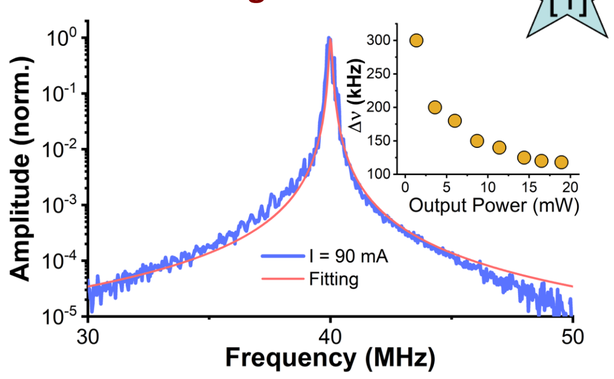


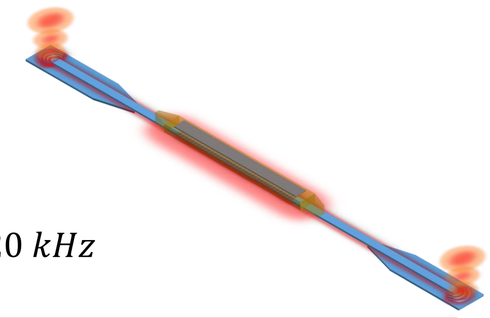
LASERS PUISSANTS ET À FAIBLE LARGEUR DE RAIE

P-I-V et spectre optique



Largeur de raie [1]



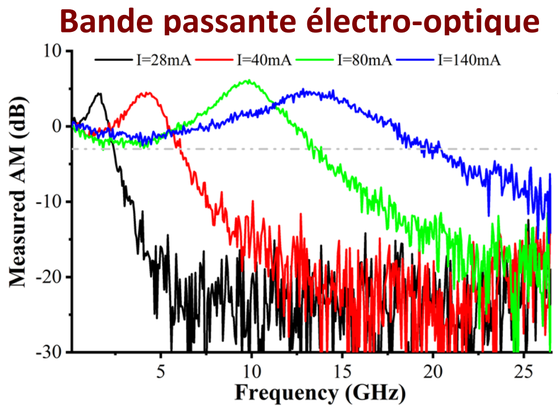


$$\Delta\upsilon < 120\ kHz$$

$$\Delta\upsilon = \frac{v_g^2 \cdot \alpha_m\,(\alpha_{m+}\alpha_{int})\eta \cdot h\upsilon \cdot n_{sp}\,(1+\alpha^2)}{4\pi P}$$

LASERS HAUT DÉBIT À MODULATION DIRECTE

Bande passante électro-optique [2]



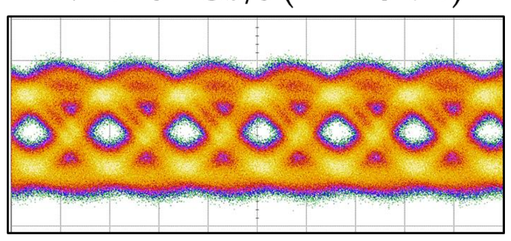
$$BW_{3dB} > 20\ GHz$$

$$f_r = 13{,}4\ \text{GHz}$$

$$f_r = \frac{1}{2\pi}\sqrt{\frac{v_g}{q}\Gamma\eta_i\frac{dg}{dN}\frac{I-I_{th}}{V}}$$

Mesures de transmission

NRZ- 32 Gb/s (ER > 5 dB)



PUBLICATIONS

[1] J. Ramirez, **A. Souleiman** et al., "Low-κ, narrow linewidth III-V-on-SOI distributed feedback lasers with backside sampled Bragg gratings," Opt. Express 30, 36717-36726 (2022).

[2] **A. Souleiman**; et al., "High-speed Direct Modulation on III-V-on-SOI Distributed Feedback lasers with intrinsic electro-optical bandwidth over 20 GHz", 2023 Conference on Lasers and Electro-Optics Europe & European Quantum Electronics Conference (CLEO/Europe-EQEC), Munich, Germany,

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