

nanoMIR

Groupe “nanoMIR” / “nanoMIR” group
“Composants à nanostructures pour Moyen Infra-Rouge”
“Nanostructure-based devices for Mid-Infra-Red Applications”

Publication list (2019)

C-INV : Communications invitées / Invited communications (national or international)

E. Tournié, L. Cerutti, J.-B. Rodriguez, J.-P. Perez, P. Christol, R. Teissier, and A.N. Baranov, Antimonide-based optoelectronic devices epitaxially grown on Si substrates, SPIE Photonics West, Opto-2019, “Silicon Photonics XIV”, 2 – 7 February 2019, San Francisco (USA), paper 10923-11.

E. Tournié, H. Nguyen Van, Z. Loghmani, L. Cerutti, J.-B. Rodriguez, J. Tournet, G. Narcy, G. Boissier, G. Patriarche, M. Bahriz, R. Teissier, A. N. Baranov, InAs/AlSb quantum cascade lasers grown on silicon substrates, SPIE Photonics West, Opto-2019, “Quantum Sensing and Nano electronics and photonics XVI”, 2 – 7 February 2019, San Francisco (USA), paper 10926-41.

R. Teissier, Z. Loghmani, M. Bahriz, et A. N. Baranov, « Long wave infrared ($\lambda=10-25 \mu\text{m}$) quantum cascade lasers for molecular spectroscopy applications », Conférence invitée à PIERS 2019, Rome, Italie, 17-juin-2019.

E. Tournié, J.-B. Rodriguez, L. Cerutti, A. N. Baranov, R. Teissier, Mid-IR semiconductor lasers epitaxially grown on Si, GDR NANOTERAMIR, 18 – 20 juin, St Raphaël, France.

E. Tournié, J.-B. Rodriguez, L. Cerutti, R. Teissier, and A.N. Baranov, Epitaxial Integration of GaSb-based mid-IR devices on Silicon, Light Conference 2019, 16 – 18 July 2019, Changchun, China: **plenary conference**.

E. Tournié, GaSb materials and devices: the IR optoelectronics toolbox, International nano-optoelectronics workshop (iNOW 2019), 20 – 28 July 2019, Guangzhou, Shenzhen (China).

E. Luna, O. Delorme, L. Cerutti, E. Tournié, J.-B. Rodriguez, and A. Trampert, “Transmission Electron Microscopy of (In,Ga)(Sb,Bi) epilayers and quantum wells” Invité: 10th International Workshop on Bismuth Containing Semiconductors, Paper Mo-7, Toulouse, France, 21-24 July

J.B. Rodriguez, M. Rio Calvo, L. Cerutti, L. Monge Bartolomé, M. Bahriz, A.N. Baranov, R. Teissier and E. Tournié, Near- to mid-IR antimonide optoelectronic devices integrated on on-axis (001) Si substrates, The 9th International Symposium on Photonics and Electronic Convergence (ISPEC 2019), 26 – 27 November 2019, Tokyo, Japan

R. Teissier, F. Barho, H. Philip, Z. Loghmani, M. Bahriz, A.N. Baranov, *Long wavelength ($\lambda = 10 - 18 \mu\text{m}$) mid-IR quantum cascade lasers operating in a continuous wave at room temperature*, Keynote presentation à **IRMMW-THz 2019**, Paris, France, 1-6 sept. 2019

A.N. Baranov, Z. Loghmani, H. Nguyen Van, L. Cerutti, J.-B. Rodriguez, J. Tournet, M. Rio-Calvo, G. Patriarche, M. Bahriz, R. Teissier, E. Tournié
InAs-based quantum cascade lasers directly grown on silicon
Infrared Terahertz Quantum Workshop (ITQW) (Ojai, USA, 15 – 20 Sep., 2019).

A.N. Baranov, R. Teissier, M. Bahriz, Z. Loghmani, H. Nguyen Van
Antimonide quantum cascade lasers, **plenary talk**
PhysicA (St. Petersburg, Russia, 21 – 24 Oct, 2019).

ACL : Articles dans des revues internationales avec comité de lecture référencées par ISI web / Peer reviewed publications referenced by ISIweb

1. 'Continuous wave operation of InAs-based quantum cascade lasers at 20 μm ', Z. Loghmani, M. Bahriz, A. Meguekam, H. Nguyen Van, R. Teissier, and A. N. Baranov, **Appl. Phys. Lett.** **115**, no. 15, p. 151101, (2019). <https://doi.org/10.1063/1.5119242>.
2. 'Terahertz quantum cascade laser with non-resonant extraction', A. N. Baranov, H. Nguyen-Van, Z. Loghmani, M. Bahriz, and R. Teissier, **AIP Adv.** **9**, no. 5, p. 055214, (2019). <https://doi.org/10.1063/1.5092855>.
3. Roman Rousseau, Zeineb Loghmani, Michael Bahriz, Kaim Chamassi, Roland Teissier, Alexei N. Baranov and Aurore Vicet Off-beam QEPAS sensor using a 11 μm DFB-QCL with an optimized acoustic resonator - Optics Express **27** (5) 7435-7446, 2019 <https://doi.org/10.1364/OE.27.007435>.
4. 'Long Wavelength ($\lambda \sim 17 \mu\text{m}$) Distributed Feedback Quantum Cascade Lasers Operating in a Continuous Wave at Room Temperature', H. Nguyen Van, Z. Loghmani, H. Philip, M. Bahriz, A. N. Baranov, and R. Teissier, **Photonics** **6**, no. 1, p. 31, (2019). <https://doi.org/10.3390/photonics6010031>.
5. 'InAs-based quantum cascade lasers emitting close to 25 μm ', Z. Loghmani, M. Bahriz, A. Meguekam, R. Teissier, and A. N. Baranov, **Electron. Lett.** **55**, no. 3, pp. 144–145, (2019). <https://doi.org/10.1049/el.2018.6413>.
6. Characterization of an InAs/GaSb type-II superlattice barrier photodetector operating in the LWIR domain, R. Alchaar, J.B. Rodriguez, L; Honglünd, S. Naureen, P. Christol, AIP Advances, **9**, 055012 (2019)
7. Indium antimonide photovoltaic cells for near-field thermophotovoltaics, Dilek Cakiroglu, Jean-Philippe Perez, Axel Evirgen, Christophe Lucchesi, Pierre-Olivier Chapuis, Thierry Taliercio, Eric Tournié, Rodolphe Vaillon, Solar Energy Materials and Solar Cells **203**, 110190 (2019). <https://doi.org/10.1016/j.solmat.2019.110190>.
8. Rodolphe Vaillon, Jean-Philippe Perez, Christophe Lucchesi, Dilek Cakiroglu, Pierre-Olivier Chapuis, Thierry Taliercio, and Eric Tournié, Micron-sized liquid nitrogen-cooled indium antimonide photovoltaic cell for near-field thermophotovoltaics, Optics Expr., **27**(4), A11 (2019). <https://doi.org/10.1364/OE.27.000A11>.
9. J. Tournet, S. Parola, A. Vauthelin, D. Montesdeoca Cardenes, S. Soresi, F. Martinez, Q. Lu, Y. Cuminal, P.J. Carrington, J. Décobert, A. Krier, Y. Rouillard and E. Tournié, GaSb-based Solar Cells for Multi-junction Integration on Si substrates, Solar Energy Materials and Solar Cells **191**, 444 (2019). Solar Energy Materials and Solar Cells **191**, 444 (2019). <https://doi.org/10.1016/j.solmat.2018.11.035>.
10. S. S. Krishtopenko, W. Desrat, K. E. Spirin, C. Consejo, S. Ruffenach, F. Gonzalez-Posada, B. Jouault, W. Knap, K. V. Maremyanin, V. I. Gavrilenko, G. Boissier, J. Torres, M. Zaknoute, E. Tournié, and F. Teppe, Massless Dirac fermions in III-V semiconductor quantum wells, Phys. Rev. B **99**, 121405(R) (2019). <https://doi.org/10.1103/PhysRevB.99.121405>.
11. S. S. Krishtopenko, S. Ruffenach, F. Gonzalez-Posada, C. Consejo, W. Desrat, B. Jouault, W. Knap, M. A. Fadeev, A. M. Kadykov, V. V. Romyantsev, S. V. Morozov, G. Boissier, E. Tournié, V. I. Gavrilenko, and F. Teppe, Terahertz Spectroscopy of Two-Dimensional Semimetal in Three-Layer InAs/GaSb/InAs Quantum Well, JETP Letters **109** (2), 96 – 101 (2019). <https://doi.org/10.1134/S0021364019020085>.
12. S. Parola, A. Vauthelin, J. Tournet, J. Kret, J. El Hussein, F. Martinez, Y. Rouillard, E. Tournié, Y. Cuminal, Improved efficiency of GaSb solar cells using an Al_{0.50}Ga_{0.50}As_{0.04}Sb_{0.96} window layer, Solar Energy Materials and Solar Cells **200**, 110042 (2019). <https://doi.org/10.1016/j.solmat.2019.110042>
13. M. Zeghouane, G. Avit, T. W. Cornelius, D. Salomon, Y. André, C. Bougerol, T. Taliercio, A. Meguekam-Sado, P. Ferret, D. Castelluci, E. Gil, E. Tournié, O. Thomas and A. Trassoudaine, Selective growth of ordered hexagonal InN nanorods, CrystEngComm **21**, 2702 – 2708 (2019).

14. R. Kudrawiec, J. Kopaczek, O. Delorme, M. P. Polak, M. Gladysiewicz, E. Luna, L. Cerutti, E. Tournié, and J. B. Rodriguez, Type I GaSb_{1-x}Bix/GaSb quantum wells dedicated for mid infrared laser applications: Photoreflectance studies of bandgap alignment, *J. Appl. Phys.* 125, 205706 (2019). <https://doi.org/10.1063/1.5094159>.
15. D.A. Díaz-Thomas, O. Stepanenko, M. Bahriz, S. Calvez, E. Tournié, A.N. Baranov, G. Almuneau, and L. Cerutti, Interband cascade lasers with AlGaAsSb cladding layers emitting at 3.3 μm , *Optics Express*, 27 (22-28), 31425 (2019). <https://doi.org/10.1364/OE.27.031425>.
16. O. Delorme, L. Cerutti, E. Luna, A. Trampert, E. Tournié, and J.-B. Rodriguez, Molecular-beam epitaxy of GaInSbBi alloys, *Journal of Applied Physics* 126, 155304 (2019); <https://doi.org/10.1063/1.5096226>
17. M. Rio Calvo, J.-B. Rodriguez, L. Cerutti, M. Ramonda, G. Patriarche, E. Tournié, Molecular-beam epitaxy of GaSb on 6°-offcut (001) Si using a GaAs nucleation layer, *Journal of Crystal Growth*, <https://doi.org/10.1016/j.jcrysgro.2019.125299>
18. M. Niehle, J.-B. Rodriguez, L. Cerutti, E. Tournié, and A. Trampert, The Interaction of Extended Defects as the Origin of Step Bunching in Epitaxial III-V Layers on Vicinal Si(001) Substrates, *Phys. Stat. Sol. RRL* 13, 1900290 (2019). <https://doi.org/10.1002/pssr.201900290>
19. R. Rousseau, N. Maurin, W. Trzypil, M. Bahriz and A. Vicet. Quartz Tuning Fork Resonance Tracking and application in Quartz Enhanced Photoacoustics Spectroscopy. *Sensors*, 19 (24) :5565 (2019) . <https://doi.org/10.3390/s19245565>
20. S. Paprotskiy, I. Altukhov, M. Kagan, N. Khval'kovskiy, I. Kohn, N. Il'inskaya, A. Usikova, A. Baranov, and R. Teissier, "Features of Tunneling Current in Superlattices with Electrical Domains," *Journal of Communications Technology and Electronics* 64(10), 1140–1143 (2019).

C-ACTI : Communications avec actes dans un congrès international / Communications with proceedings at international conferences.

1. *Midwave infrared barrier detector based on Ga-free InAs/InAsSb Type-II superlattice grown by molecular beam epitaxy on Si substrate*, J.P. Perez, Q. Durlin, L. Cerutti, J.B. Rodriguez, T. Cerba, T. Baron, E. Tournié, P. Christol, QSIP 2018 conference, *Infrared Physics & Technology* 96, 39-43 (2019)
2. *Study of the MTF of MWIR T2SL focal plane array in IDDCA configuration*, J. Nghiem, J. Jaeck, S. Derelle, J. Primot, M. Caes, S. Bernhardt, E. Huard, R. Haidar, L. Höglund, E. Costard, J.B. Rodriguez, P. Christol, I. Ribet-Mohamed, QSIP 2018 conference, *Infrared Physics & Technology* 96, 192-198 (2019)
3. *Temporal stability and correctability of a MWIR T2SL focal plane array*, I. Ribet-Mohamed, J. Nghiem, M. Caes, A. Kattinig, L. Höglund, E. Costard, J.B. Rodriguez, P. Christol, QSIP 2018 conference, *Infrared Physics & Technology* 96, 145-150 (2019)
4. *Temporal stability measurements of a cooled infrared type II superlattice (T2SL) focal plane array detector*, V. Arounassalame, J. Nghiem, M. Guenin, E Costard, P Christol, I Ribet-Mohamed, International Conference on Noise and Fluctuation (ICNF 2019), Neuchâtel, June 2019, IEEE Conference Proceedings doi 10.5075/epfl-ICLAB-ICNF-269244
5. *Residual fixed pattern noise and random telegraph signal noise of a MWIR T2SL FPA*, I Ribet-Mohamed, V Arounassalame, J Nghiem, M Caes, L Höglund, E Costard, P Christol, DCS SPIE Conference, Baltimore, April 2019, Proceedings of the SPIE "Infrared Technology and Applications XLV, **11002**, 110020E (2019)

C-COM : Communications orales sans actes dans un congrès international ou national / Oral communications without proceedings at international or national conferences.

O. Delorme, L. Cerutti, E. Luna, A. Trampert, E. Tournié and J.-B. Rodriguez, "Study of In incorporation into GaSbBi alloys", 20th European Workshop on Molecular Beam Epitaxy (EuroMBE 2019), February 2019, Lenggries, Germany

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R. Teissier, A. N. Baranov, H. Nguyen-Van, Z. Loghmari, et M. Bahriz, « Terahertz quantum cascade laser with non-resonant extraction », Communication orale présenté à French German THz Conference 2019, Kaiserslautern, Allemagne, 05-avr-2019.

F. Barho, F. Gonzalez-Posada, L. Cerutti and T. Taliercio, “Surface-Enhanced Thermal Emission Spectroscopy with Heavily-doped-Semiconductor Metamaterial Perfect Absorber” Oral: International Conference on Enhanced Spectroscopy, London, Canada, 17-20 June 2019.

F. Barho, F. Gonzalez-Posada, L. Cerutti, and T. Taliercio, “Molecular sensing with surface enhanced thermal emission spectroscopy” European Materials Research Society Spring Meeting (EMRS 2019), paper P 7.6, Nice, France, 27-31 May 2019

D.A. Diaz Thomas, O. Stepanenko, T. Batte, M. Bahriz, S. Calvez, C. Paranthoen, E. Tournié, G. Almuneau, C. Levallois, and L. Cerutti, “Toward MIR VCSELs operating in CW at RT” Oral: Compound semiconductor Week (CSWeek 2019), Paper WeB2-1, Nara, Japan, 19-23 May 2019

O. Delorme, L. Cerutti, E. Luna, A. Trampert, E. Tournié, and J.-B. Rodriguez, “Molecular-beam epitaxy of Ga(In)SbBi alloys and QWs” Oral: 10th International Workshop on Bismuth Containing Semiconductors, Paper Mo-2, Toulouse, France, 21-24 July

Characterization and performance analysis of InAs/GaSb T2SL photodetector for LWIR/VLWIR spectral domain, R. Alchaar, J.B. Rodriguez, L. Höglund, P. Christol, Infrared Colloquium, Freiburg, March 2019

C-AFF : Communications par affiche dans un congrès international ou national / Poster at international or national conferences.

F. Barho, L. Cerutti, F. Gonzalez-Posada Flores, and T. Taliercio “Metamaterial perfect absorber based on heavily doped semiconductor for thermal emission” Poster: Compound semiconductor Week (CSWeek 2019), Paper MoP-D-6, Nara, Japan, 19-23 May 2019

F. Barho, F. Gonzalez-Posada Flores, L. Cerutti, and T. Taliercio “Bio-sensing by thermal emission of metamaterial perfect absorber” Poster: Surface Plasmon Photonics (SPP9), Paper no. 212, Copenhagen, Denmark, 26-31 May 2019

C. Maës, G. Vincent, F. Gonzalez-Posada Flores, L. Cerutti, R. Haidar, and T. Taliercio “Semiconductors nanostructures for spectral filtering” Poster: Surface Plasmon Photonics (SPP9), Paper no. 212, Copenhagen, Denmark, 26-31 May 2019

L. Monge Bartolomé, M. Bahriz, D.A. Diaz-thomas, G. Narcy, M. Rio Calvo, J.B. Rodriguez, L. Cerutti and E. Tournié, “Toward mid-IR optoelectronic devices on silicon photonic integrated circuits” International nano-optoelectronics workshop (INOW 2019), Guangzhou, China, 20-28 July 2019.

O. Delorme, L. Cerutti, E. Tournié, and J.-B. Rodriguez, “In-Situ determination of the growth conditions of GaSbBi alloys” Poster: 10th International Workshop on Bismuth Containing Semiconductors, Paper Poster 3, Toulouse, France, 21-24 July

Books

E. Tournié, Molecular-beam epitaxy of antimonides for optoelectronic devices, In: *Molecular-Beam Epitaxy: Materials and Devices for Electronics and Optoelectronics*, edited by H. Asahi and Y. Horikoshi (Wiley, New York, 2019), pp. 233 – 246. ISBN: 978-1-119-35502-1.
<https://doi.org/10.1002/9781119354987.ch14>.

O. Delorme, L. Cerutti, R. Kudrawiec, E. Luna, J. Kopaczek, M. Gladysiewicz, A. Trampert, E. Tournié, and J.-B. Rodriguez, *GaSbBi alloys and heterostructures: fabrication and properties*, in: *Bismuth-Containing Alloys and Nanostructures*, edited by Wang, Shumin and Lu, Pengfei (Springer Series in Materials Science, Vol. 285, 2019), pp. 125-161. ISBN : 978-981-13-8077-8.
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L. Cerutti, A. Vicet and E. Tournié, Interband mid-infrared lasers, in: *Mid-Infrared optoelectronics: Materials, Devices, Applications*, edited by E. Tournié and L. Cerutti, (Elsevier, Woodhead Publishing, Duxford, UK, 2019), pp. 91 - 130. <https://doi.org/10.1016/B978-0-08-102709-7.00003-6>