

CURRICULUM VITAE

Stephanie RENNESSON

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Research Experience

- Mar. 2018 **Postdoctoral Fellow** **CRHEA-CNRS**
to Feb. 2019 Principal Investigator: Dr. F. Semond - *FUNDED BY THE MILAGAN ANR PROJECT*
Main topic: Electrically pumped GaN-based microdisk laser
- To optimize the growth of electrically pumped GaN-based microdisk laser.
- Mar. 2017 **Postdoctoral Fellow** **CRHEA-CNRS**
to Feb. 2018 Principal Investigator: Dr. F. Semond - *FUNDED BY THE "LABEX" GANEX*
Main topic: AlN-based HEMTs for RF applications
- To study and optimize AlN-based HEMTs on Si and SiC substrates.
- Sept. 2015 **Postdoctoral Fellow** **CRHEA-CNRS**
to Feb. 2017 Principal Investigator: Dr. F. Semond - *FUNDED BY THE "LABEX" GANEX*
Main topic: Templates of AlN-on-Silicon substrate
- To study and optimize AlN/Si.
 - To develop templates for LEDs and Transistors.
- Jan. to **Postdoctoral Associate** **Massachusetts Institute of Technology**
Aug. 2015 Principal Investigator: Prof. T. Palacios
Main topic: High Speed GaN-based High Electron Mobility Transistors
- Developed regrown Ohmic contact in collaboration with French growth labs.
- Jan. to **Postdoctoral Fellow** **CRHEA-CNRS**
Dec. 2014 **Visiting Researcher** **Massachusetts Institute of Technology**
Principal Investigators: Prof. T. Palacios and Dr. Y. Cordier - *FUNDED BY THE FRENCH MINISTRY OF DEFENSE - DÉLÉGATION GÉNÉRALE DE L'ARMEMENT.*
Main topic: AlGaIn/GaN High Electron Mobility Transistors with an InGaIn back-barrier: an assessment of power performances operating at microwave frequency
- Developed submicron T-shape gate transistor.
- Oct. 2010 **PhD in Material Engineering** **CRHEA-CNRS**
to Dec. 2013 Advisor: Dr. Y. Cordier and *THESIS CO-FUNDED BY THE FRENCH MINISTRY OF DEFENSE - DÉLÉGATION GÉNÉRALE DE L'ARMEMENT AND THE CNRS.*
Main Topic: Nitride-based High Electron Mobility Transistors developments for microwave applications
- Optimized the barrier thickness for high power RF GaN-based transistors.
 - Validate the effect of an InGaIn and AlGaIn back-barrier.
 - Optimized the passivation on GaN-based transistors.
- Feb. to **Process Engineer** **ONERA-DOTA and LPN**
Aug. 2010 Advisors: Dr. R. Haidar and Dr. J.-L. Pelouard
Main topic: Fabrication and characterization of carbon nanotubes based infrared detector

Jul 2009 **Experimenter Assistant** *L2C*
 Advisor: Dr. T.Guillet
 Main topic: Optical spectroscopy of ZnO micro-disks and GaN micro-cavities

Skills

Growth of semiconductors

- Growth of nitride-based heterostructures by ammonia-assisted molecular beam epitaxy.

Structural, Electrical and Optical characterizations

- Structural: SEM, AFM, XRD.
- Electrical: Capacitance-Voltage, Hall, DC and pulsed current-voltage, RF measurements and breakdown voltage measurements.
- Optical: Photoluminescence on ZnO micro-disks and GaN micro-cavities, Fourier transform infrared spectroscopy to determine carbon nanotubes films optical properties, electroluminescence on GaN-based HEMTs.

Micro/Nanofabrication of electronic devices in cleanroom environment

- Photolithography, e-beam evaporation, RIE, wet etching, ALD, PECVD, RTA, dicer, familiar with direct bonding.
- Nanoscale fabrication: e-beam lithography and FIB.

Education

Oct. 2010 **PhD in Material Engineering** *University of Nice-Sophia Antipolis (France)*
 to Dec. 2013 “Nitride-based High Electron Mobility Transistors developments for microwave applications”, supervised by Dr. Y. Cordier at the Research Center of HeteroEpitaxy and its Applications (CRHEA-CNRS).
 Committee: Dr. R. Teissier, Prof. C. Bolognesi, Prof. E. Calleja, Dr. M. Germain, Dr. V. Hoel, Dr. B. Damilano, C. Moreau.

Sept. 2009 **2nd year of Master of Science** *Montpellier University of Technology (France)*
 to Sept. 2010 “Materials for Microelectronics and Nanotechnologies”
 Subject studied: semiconductor and electronic components, device systems, nanotechnologies and components fabrication in clean room.

Sept. 2008 **1st year of Master of Science** *Wroclaw University of Technology (Poland)*
 to Jun. 2009 “ERASMUS program”
 Subject studied: solid state physics, quantum and statistical mechanics, group theory, mathematical methods for physicists and quantum information.

Sept. 2005 **Bachelor of Science** *Montpellier University of Technology (France)*
 to Jun. 2008 “Fundamental Physics”
 Subject studied: mechanics, thermodynamics, electromagnetism, statistical mechanics, mathematics and optics.

Languages

- French (mother tongue)
- English (fluent)
- Italian (basic knowledge)
- Polish (beginner)

Publications

1. "A universal description of III-V/Si epitaxial growth processes", I. Lucci, S. Charbonnier, L. Pedesseau, M. Vallet, L. Cerutti, J.-B. Rodriguez, E. Tournié, R. Bernard, A. Létoublon, N. Bertru, A. Le Corre, S. Rennesson, F. Semond, G. Patriarche, L. Largeau, P. Turban, A. Ponchet and C. Cornet, *Physical Review Materials*, **2** (6), p. 060401, (2018).
2. "Proposition of a model elucidating the AlN-on-Si (111) microstructure", N. Mante, S. Rennesson, E. Frayssinet, L. Largeau, F. Semond, J. L. Rouvière, G. Feuillet, and P. Vennéguès, *Journal of Applied Physics*, **123** (21), p. 215701, (2018).
3. "Impact of AlN/Si nucleation layers grown either by NH₃-MBE or MOCVD on the properties of AlGa_{0.2}N/GaN HFETs", H. Yacoub, T. Zweipfennig, H. Kalisch, A. Vescan, A. Dadgar, M. Wieneke, J. Bläsing, A. Strittmatter, S. Rennesson and F. Semond, *Physica Status (a)*, p. 1700638, (2018).
4. "Ultrathin AlN-based HEMTs grown on silicon substrate by NH₃-MBE", S. Rennesson, M. Leroux, M. Al Khalfioui, M. Nemoz, S. Chenot, J. Massies, L. Largeau, E. Dogmus, M. Zegaoui, F. Medjdoub and F. Semond, *Physica Status Solidi (a)*, p. 1700640, (2017).
5. "Laser damage of free-standing nanometer membranes", Y. Morimoto, I. Roland, S. Rennesson, F. Semond, P. Boucaud and P. Baum, *Journal of Applied Physics*, **122** (21), p. 215303, (2017).
6. "Q factor limitations at short wavelength (around 300 nm) in III-nitride-on-silicon photonic crystal cavities", F. Tabataba-Vakili, I. Roland, T.-M. Tran, X. Checoury, M. El Kurdi, S. Sauvage, C. Brimont, T. Guillet, S. Rennesson, J.-Y. Duboz, F. Semond, B. Gayral, and P. Boucaud, *Applied Physics Letters*, **111** (13), p. 131103, (2017).
7. "Efficient second harmonic generation in low-loss planar GaN waveguides", M. Gromovyi, J. Brault, A. Courville, S. Rennesson, F. Semond, G. Feuillet, P. Baldi, P. Boucaud, J.-Y. Duboz, and M. P. De Micheli, *Optics Express*, **25** (19), p. 23035, (2017).
8. "Short-wave infrared ($\lambda=3 \mu\text{m}$) intersubband polaritons in the GaN/AlN system", T. Laurent, J.-M. Manceau, E. Monroy, C. B. Lim, S. Rennesson, F. Semond, F. H. Julien, and R. Colombelli, *Applied Physics Letters*, **110** (13), p. 131102, (2017).
9. "Anomalous DC and RF Behavior of Virgin AlGa_{0.2}N/AlN/GaN HEMTs", H. Sánchez Martín, O. García, S. Perez, P. Altuntas, V. Hoel, S. Rennesson, Y. Cordier, T. Gonzalez, J. Mateos, and I. Iniguez de la Torre, *Semicond. Sci. Tech.*, **32** (3), p. 035011, (2017).
10. "III-Nitride-on-silicon microdisk lasers from the blue to the deep ultra-violet", J. Sellés, V. Crepel, I. Roland, M. El Kurdi, X. Checoury, P. Boucaud, M. Mexis, M. Leroux, B. Damilano, S. Rennesson, F. Semond, B. Gayral, C. Brimont, and T. Guillet, *Applied Physics Letters*, **109** (23), p. 231101, (2016).
11. "Polarity in GaN and ZnO: Theory, measurement, growth, and devices", J. Zúñiga-Pérez, V. Consonni, L. Lymperakis, X. Kong, A. Trampert, S. Fernández-Garrido, O. Brandt, H. Renevier, S. Keller, K. Hestroffer, M. R. Wagner, J. S. Reparaz, F. Akyol, S. Rajan, S. Rennesson, T. Palacios, and G. Feuillet, *Applied Physics Reviews*, **3** (4), p. 041303, (2016).
12. "Power Performance at 40 GHz of AlGa_{0.2}N/GaN High-Electron Mobility Transistors Grown by Molecular Beam Epitaxy on Si(111) Substrate", P. Altuntas, F. Lecourt, A. Cutivet, N. Defrance, E. Okada, M. Lesecq, S. Rennesson, A. Agboton, Y. Cordier, V. Hoel, and J.-C. De Jaeger, *IEEE Electron Device Letters*, **36** (4), p. 303, (2015).
13. "Polarization Engineering of Al(Ga)N/GaN HEMT structures for Microwave High Power Applications", S. Rennesson, F. Lecourt, N. Defrance, M. Chmielowska, S. Chenot, M. Lesecq, V. Hoel, E. Okada, Y. Cordier and J.-C. De Jaeger, *Materials Science Forum*, **806**, p.81, (2014).

14. "Optimization of $\text{Al}_{0.29}\text{Ga}_{0.71}\text{N}/\text{GaN}$ High Electron Mobility Heterostructures for High Power/Frequency Performances", S. Rennesson, F. Lecourt, N. Defrance, M. Chmielowska, S. Chenot, M. Leseq, V. Hoel, E. Okada, Y. Cordier and J.-C. De Jaeger, *IEEE Transaction on Electron Devices*, **60** (10), p. 3105, (2013).
15. "Analysis of the AlGaIn/GaN vertical bulk current on Si, sapphire, and freestanding GaN substrates", A. Pérez-Tomás, A. Fontserè, J. Llobet, M. Placidi, S. Rennesson, N. Baron, S. Chenot, J. C. Moreno, and Y. Cordier, *Journal of Applied Physics*, **113**, p. 174501, (2013).
16. "Molecular Beam Epitaxial AlGaIn/GaN High Electron Mobility Transistors Leakage Thermal Activation on Silicon and Sapphire", A. Fontserè, A. Pérez-Tomás, M. Placidi, N. Baron, S. Chenot, J. C. Moreno, S. Rennesson and Y. Cordier, *Applied Physics Letters*, **102**, p. 093503 (2013).
17. " AlGaIn/GaN HEMTs with an InGaIn back-barrier grown by Ammonia-assisted Molecular Beam Epitaxy", S. Rennesson, B. Damilano, P. Vennéguès, S. Chenot and Y. Cordier, *Physica Status Solidi (a)*, **210**(3), p.480-483, (2013).
18. "Complex optical index of single wall carbon nanotube films from the near-infrared to the terahertz spectral range", S. Maine, C. Koechlin, S. Rennesson, J. Jaeck, S. Salort, B. Chassagne, F. Pardo, J.-L. Pelouard and R. Haïdar, *Applied optics*, **51**(15), p. 3031-3035, (2012).
19. "High quality factor photonic resonators for nitride quantum dots", T. Guillet, M. Mexis, S. Sergent, D. Néel, S. Rennesson, C. Brimont, T. Bretagnon, B. Gil, D. Sam-Giao, B. Gayral, F. Semond, M. Leroux, S. David, X. Checoury and P. Boucaud, *Physica Status Solidi (b)*, **249**(3), p. 449-454, (2012).
20. "Potential of carbon nanotubes films for infrared bolometers", C. Koechlin, S. Maine, S. Rennesson, R. Haidar, B. Tretout, J. Jaeck, N. Pere Laperne and J.-L. Pelouard, *Conf. on Quantum Sensing and Nanophotonic Devices VIII, San Francisco JAN 23-27 2011, Proceedings of SPIE*, **7945**, p. 794521, (2011).
21. "Opto-electrical characterization of infrared sensors based on carbon nanotube films" C. Koechlin, S. Maine, S. Rennesson, R. Haidar, B. Tretout, A. Loiseau and J.-L. Pelouard, *Comptes Rendus Physique*, **11**(5-6), p. 405-410, (2010).

Given oral presentations

1. "AlN-based HEMTs grown on silicon substrate by NH_3 -MBE", S. Rennesson, M. Nemoz, J. Massies, S. Chenot, M. Al Khalfioui, M. Leroux, L. Largeau, E. Dogmus, M. Zegaoui, F. Medjdoub and F. Semond, *International Conference on Nitride Semiconductors (ICNS), July 24th-28th 2017, Strasbourg, France* (www.icns-12.coulomb.univ-montp2.fr).
2. "AlN buffer layer on Silicon grown by NH_3 -MBE for Transistors", S. Rennesson, M. Nemoz and F. Semond, *European Materials Research Society (EMRS), May 2nd-6th, 2016, Lille, France* (www.european-mrs.com/2016-spring-symposium-1-european-materials-research-society).
3. "Electroluminescence of high-biased AlGaIn/GaN HEMTs with an InGaIn back-barrier: hot electrons or/and impact ionization mechanism?", S. Rennesson, B. Damilano, and Y. Cordier, *European Materials Research Society (EMRS), May 2nd-6th, 2016, Lille, France* (www.european-mrs.com/2016-spring-symposium-1-european-materials-research-society).
4. "GaIn-on-Si Transistors with Submicron Buffer Thickness: The Future of Low Cost Power Electronics", S. Rennesson, E. Frayssinet, F. Semond and T. Palacios, *Compound Semiconductor Week 2015 (CSW), June 28-July 2nd, 2015, Santa Barbara, USA*, (www.csw2015.ece.ucsb.edu).

5. "Polarization Engineering of Al(Ga)N/GaN HEMTs for High Power Applications at 40 GHz", S. Rennesson, F. Lecourt, N. Defrance, M. Chmielowska, S. Chenot, M. Lesecq, V. Hoel, E. Okada, Y. Cordier and J.-C. De Jaeger, *5th Conference on SiC Hetero-Epitaxy and Workshop on Advanced Semiconductor Materials and devices for Power Electronics applications (HeteroSiC-WASMPE)*, June 17-19, 2013, Nice, France, (www.novasic.com/heterosic-wasmpe2013).
6. "AlGaN/GaN HEMT: setting a high 2DEG density by playing on material parameters", S. Rennesson, M. Chmielowska, S. Chenot and Y. Cordier, *21st European Workshop on Heterostructure Technology*, November 5-7, 2012, Barcelona, Spain, (www.hetech2012.org).
7. "NH₃ source Molecular Beam Epitaxy growth of AlGaN/GaN HEMTs with an InGaN back-barrier", S. Rennesson, B. Damilano, P. Vennéguès, S. Chenot and Y. Cordier, *4th International Symposium on Growth of III-Nitrides*, July 16-19, 2012, St. Petersburg, Russia, (www.ioffe.ru/ISGN4).
8. "AlGaN/GaN HEMT with InGaN back-barrier grown by NH₃ source Molecular Beam Epitaxy", S. Rennesson, B. Damilano, P. Vennéguès, S. Chenot and Y. Cordier, *11th Expert Evaluation and Control of Compound Semiconductor Materials and Technology*, 30th May-1st June 2012, Island of Porquerolles, France (www.crhea.cnrs.fr/wocsdice-exmatec2012).
9. "Effects of InGaN back-barrier on AlGaN/GaN High Electron Mobility Transistor", S. Rennesson, B. Damilano, S. Chenot and Y. Cordier, *20th European workshop on Heterostructure Technology*, November 7-9, 2011, Lille, France, (www.hetech2011.iemn.univ-lille1.fr).