

Jonathan Grandidier

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Research Experience and Education

- 2010 – 2013** **California Institute of Technology** – Pasadena, CA – U.S.A.
Post-doctoral scholar in the Atwater Group - Applied physics.
- 2007 – 2009** **Ph.D. in Nanotechnology** – Dijon – France.
University of Burgundy, department of nanoscience.
- 1998 - 2003** **Franco-Canadian Double Diploma in Engineering** – Master degree,
Generalist, EPF, Paris - France – ETS, Montreal - Canada.

Research Technics

Photovoltaics/Plasmonics:

- Current-Voltage and External Quantum Efficiency measurements on solar cells
- Thin film deposition (Sputtering, thermal)
- Scanning probes and confocal microscopies (AFM)

Data Analysis/Simulations:

- Data analysis for Cassini Power Subsystem telemetry data.
- Pattern recognition and signal processing using advanced algorithms to identify defects on a wheelset of commercial train.
- Development of a Matlab multi-layer solar cell modelling code using transfer matrix method.
- 3D Modeling of a solar cells using Finite Difference Time Domain Simulation (FDTD).
- Numerical and analytical modelling of plasmonic waveguides at visible and near infrared wavelengths using differential method, Green's function method and effective index model.
- Experienced with Matlab, Python.

Working Experience

- 2013 – Present** **Jet Propulsion Laboratory**, Pasadena, CA – U.S.A. Research Technologist.
Cassini Power Lead Engineer and Photovoltaics for space applications
- 2004 – 2006** **Valeo Security Systems**, Dijon - France. Valeo Production System Engineer.
Lean Manufacturing - Production optimization using Kaizen and 5S methods.
- 2003 – 5 months** **Siemens AG**, Munich - Germany. Corporate Technology.
Research and development project of online monitoring and data analysis of an intelligent wheelset for German high speed train "ICE".
- 2001 – 5 months** **Hitachi**, Kanagawa - Japan. Manufacturing Operation
Realization of an automated Low Ohmic Resistance Controller and a High Ohmic Resistance Controller for printed boards.

Patent and Grants

- 2017 \$650K - NASA - HOTTech program - Low Intensity High Temperature (LIHT) Solar Cells for Venus Exploration Missions.
- 2016 \$400K - NASA - STMD - Extreme Environment Solar Power using Micro-Concentrator Module for deep space.
- 2014 \$3M - ARPA-E - FOCUS - Full Spectrum Power for Optical/Thermal Exergy.

- 2012 \$500K - Bay Area Photovoltaic Consortium (BAPVC).
2011 Invented the concept of whispering gallery mode solar cells - US Patent 61/382.422

Awards

- **JPL Section 346 – Power & Sensor Systems Voyager Award**, March 2017
- **SPIE Photonics West Green Photonics Award 2012**, San Francisco – U.S.A.
- **Prix the thèse 2010**, Franche Comté/Burgundy doctoral schools, Besançon – France
- **Carnot Foundation Fellowship 2009**, Paris – France

Mentoring Experience

- **2014 SURF Program - JPL**: Roel Rodriguez – Project on solar cell array optimization.
- **2012 SURF Program - Caltech**: Max Wang – Solgel solar cells – 2nd place in SURF award.
- **2011 SURF Program - Caltech**: Colton Bukowsky – Project on light trapping for solar cells

Teaching Experience

California Institute of Technology (2011), Solid State Physics APh114c.	8 hours
ESEO Engineering School - France (2009), Electromagnetism and Optics.	64 hours
University of Burgundy - France (2008), Electronics.	24 hours
Ecole de Technologie Supérieure - Canada (2002), Material and fabrication process for aeronautics.	24 hours

Invited talks

- **NETS-2017**, Orlando FL – U.S.A., February 2017, “Cassini Power Subsystem”.
- **University of Southern California**, Los Angeles CA – U.S.A., November 2012, “Solar cell efficiency enhancement via light trapping in resonant dielectric sphere arrays”. Seminar online: http://youtu.be/etbCeE_vSc8
- **University of California**, Irvine CA, U.S.A., October 2012, “Polymer-Metal Plasmonic Waveguides: passive and active components for integrated photonics”. Seminar online: <http://youtu.be/hNtswMzoBKE>
- **ECOC**, Amsterdam, The Netherland, September 2012, “Merging Plasmonics with Silicon Photonics CMOS compatible plasmonics for Network-on-Chip applications”
- **SPIE Photonics West**, San Jose, CA – U.S.A., January 2012, “Simulations of solar cell absorption enhancement using whispering gallery modes of dielectric nanospheres”.
- **Université Claude Bernard Lyon 1**, Lyon – France, Novembre 2009. “Guide plasmonique polymère-métal : composants passifs et actifs pour la photonique intégrée”.

Reviewing Activities

Reviewer for Nano letters, Advanced Materials, Optics Express, Optics Letters.

Organization

- The International Society for Optical Engineering (SPIE)
- Materials Research Society (MRS)
- IEEE Photonics Society

List of Publications

Peer Reviewed

1. **J. Grandidier**, J. B. Gilbert and G. A. Carr, *Cassini Power Subsystem*, NETS 2017, Paper #20183 (2017). 10 pages

2. C. R. Bukowsky, J. Grandidier, K. T. Fountaine, D. M. Callahan, B. J. Stanbery and H. A. Atwater, *Photon and carrier management design for nonplanar thin-film copper indium gallium selenide photovoltaics*. *Solar Energy Materials and Solar Cells* **161**, 149-156, (2017). 8 pages
3. T. J. Hendricks, B. J. Nesmith and J. Grandidier, *Temperature-Staged Thermal Energy Storage Enabling Low Thermal Exergy Loss Reflux Boiling in Full Spectrum Solar Systems*. ASME 2016 International Mechanical Engineering Congress & Exposition, Paper #IMECE2016-67013 (2016). 11 pages
4. D. E. Lee, B. J. Nesmith, T. J. Hendricks, J. Cepeda-Rizo, M. Petach, E. Tward, C. Penera, J. Pohner, S. Whitney and J. Grandidier, *Efficient Heat Transfer Methods in a Hybrid Solar Thermal Power System for the FSPOT-X Project*. ASME 2015 Power and Energy Conversion Conference, Paper #PowerEnergy2015-49658 (2015). 7 pages
5. M. Schmid, J. Grandidier and H. A. Atwater, *Scanning near-field optical microscopy on dense random assemblies of metal nanoparticles*, *Journal of Optics* **15**, 125001 (2013). 13 pages
6. J. Grandidier, R. A. Weitekamp, M. G. Deceglie, D. M. Callahan, C. Battaglia, C. Bukowsky, C. Ballif, R. H. Grubbs and H. A. Atwater, *Solar Cell Efficiency Enhancement via Light Trapping in Printable Resonant Dielectric Nanosphere Arrays*. *Physica Status Solidi A* **210** 255 (2013). 6 pages
7. J. Grandidier, M. G. Deceglie, D. M. Callahan and H. A. Atwater, *Simulations of solar cell absorption enhancement using resonant modes of a nanosphere array*. *Journal of Photonics for Energy* **2**, 024502 (2012). 12 pages
8. J. Grandidier, D. M. Calahan, J. N. Munday and H. A. Atwater, *Gallium Arsenide Solar Cell Absorption Enhancement Using Whispering Gallery Modes of Dielectric Nanospheres*. *IEEE Journal of Photovoltaics* **2** (2), 123-128 (2012). 6 pages
9. J. Grandidier, D. M. Calahan, J. N. Munday and H. A. Atwater, *Light absorption enhancement in ultrathin solar cells using whispering gallery modes in dielectric nanospheres*. *Advanced Materials* **23**, 1272–1276 (2011). 5 pages
10. R. M. Briggs, J. Grandidier, Stanley P. Burgos, Eyal Feigenbaum and H. A. Atwater, *Efficient coupling between dielectric-loaded plasmonic and silicon photonic waveguides*. *Nano Letters* **10** (12), 4851–4857 (2010). 7 pages
11. G. Colas des Francs, P. Bramant, J. Grandidier, A. Bouhelier, J.-C. Weeber and A. Dereux, *Optical gain, spontaneous and stimulated emission of surface plasmon polaritons in confined plasmonic waveguide*. *Optics Express* **18**, 16327–16334 (2010). 8 pages
12. J. Grandidier, G. Colas des Francs, L. Markey, S. Massenet, J.-C. Weeber, A. Bouhelier and A. Dereux, *Dielectric-loaded surface plasmon polariton waveguides on a finite-width metal stripe at telecom wavelength*. *Appl. Phys. Lett.* **96**, 063105 (2010). 3 pages
13. J. Grandidier, G. Colas des Francs, S. Massenet, A. Bouhelier, J.-C. Weeber, L. Markey and A. Dereux, *Leakage radiation microscopy of surface plasmon coupled emission: investigation of gain assisted propagation in an integrated plasmonic waveguide*. *Journal of Microscopy* **239**, 167–172 (2010). 6 pages
14. G. Colas des Francs, J. Grandidier, S. Massenet, A. Bouhelier, L. Markey, J.-C. Weeber and A. Dereux. *Plasmonic waveguide dispersion in the momentum space*. *Phys. Rev. B* **80**, 115419 (2009). 7 pages
15. J. Grandidier, G. Colas des Francs, S. Massenet, A. Bouhelier, L. Markey, J.-C. Weeber and A. Dereux. *Gain-Assisted Propagation in a Plasmonic Waveguide at Telecom Wavelength*. *Nano Letters* **9**, 2935–2939 (2009). 5 pages

16. J. Grandidier, S. Massenot, G. Colas des Francs, A. Bouhelier, J.-C. Weeber, L. Markey, A. Dereux, J. Renger, M. U. Gonzalez and R. Quidant. *Dielectric loaded surface plasmon polariton waveguide: Figures of merit and mode characterization by image and Fourier plane leakage microscopy*. Phys. Rev. B **78**, 245419 (2008). 9 pages
17. S. Massenot, J.-C. Weeber, A. Bouhelier, G. Colas des Francs, J. Grandidier, L. Markey, and A. Dereux. Differential method for modeling dielectric-loaded surface plasmon polariton waveguides. Optics Express **16**, 17599–17608 (2008). 10 pages
18. S. Massenot, J. Grandidier, A. Bouhelier, G. Colas des Francs, J.-C. Weeber, L. Markey, A. Dereux, J. Renger, M.U. Gonzalez and R. Quidant. *Polymer-metal waveguides characterization by Fourier plane leakage radiation microscopy*. Appl. Phys. Lett. **91**, 243102 (2007). 3 pages
19. J. C. Weeber, A. Bouhelier, G. Colas des Francs, S. Massenot, J. Grandidier, L. Markey and A. Dereux. *Surface plasmon propagation along co-planar coupled cavities*, Phys. Rev. B **76**, 113405 (2007). 4 pages

Conference Proceedings

1. A. Boca, J. Grandidier, C. McPheeters, P. Sharps, P. Chiu, X.-Q. Liu and J. Ermer, *Advanced-Architecture High-Efficiency Solar Cells for Low Irradiance Low Temperature (LILT) Applications*, Proceedings of the 44th IEEE Photovoltaic Specialists Conference – Washington DC (2017)
2. J. Grandidier, B. J. Nesmith, T. J. Hendricks, M. B. Petach, E. Tward, Scott A. Whitney, J. Cepeda-Rizo, J. Paredes Garcia, M. E. Devost, H. Hayden, N. Fette, T. Beeney and D. E. Lee, *Full Spectrum hybrid photovoltaics and thermal engine utilizing high concentration solar energy*, Proceedings of the 43rd IEEE Photovoltaic Specialists Conference – Portland OR (2016).
3. C. R. Bukowsky, J. Grandidier, K. T. Fountaine, D. M. Callahan, B. J. Stanbery and H. A. Atwater, *Absorption Enhancing and Passivating Non-planar Thin-Film Device Architectures for Copper Indium Gallium Selenide Photovoltaics*. Proceedings of the 43rd IEEE Photovoltaic Specialists Conference – Portland OR (2016).
4. J. Grandidier, P. Gogna, M. Errico, B. Nesmith and D. E. Lee, *Solar cell measurements at high temperature*, Proceedings of the 42nd IEEE Photovoltaic Specialists Conference – New Orleans LA (2015).
5. P. von Allmen, J. Grandidier, and P. M. Stella, *Modelling of a Gallium Arsenide Solar Cell under Low Intensity and Low Temperature Conditions for Space Applications*, Proceedings of the 40th IEEE Photovoltaic Specialists Conference – Denver CO (2014).
6. M. Wang, J. Grandidier, S. M. Jones, H. A. Atwater, Graded index Sol-Gel antireflection coatings. Proceedings of the 39th IEEE Photovoltaic Specialists Conference – Tampa FL (2013).
7. J. Grandidier, D. M. Callahan and H. A. Atwater. *Configuration Optimization of a Nanosphere Array on Top of a Thin Film Solar Cell*. Proceedings of the 37th IEEE Photovoltaic Specialists Conference – Seattle WA (2012).
8. J. Grandidier, Michael G. Deceglie, Dennis M. Callahan, Harry A. Atwater. *Simulations of solar cell absorption enhancement using resonant modes of a nanosphere array*. SPIE Vol. 8256 (2012).
9. S. Massenot, A. Bouhelier, G. Colas des Francs, J. Grandidier, L. Markey, J.-C. Weeber and A. Dereux. *Etude et caractérisation expérimentale de plasmons de surface confinés par des guides d'ondes diélectriques*. JNOG Lannion (2008)

10. J. Grandidier, S. Massenot, A. Bouhelier, G. Colas des Francs, J.-C. Weeber, L. Markey and A. Dereux. *Surface plasmon routing in dielectric-loaded surface plasmon polariton waveguides*. SPIE Vol. 7033 (2008).

Review

1. S. Massenot, A. Bouhelier, G. Colas des Francs, J. Grandidier, L. Markey, J.-C. Weeber and A. Dereux. *Etude et caractérisation expérimentale de plasmons de surface confinés par des guides d'ondes diélectriques*. Photoniques n°39 (2009)

Book and book chapter

1. A. Bouhelier, G. Colas des Francs and J. Grandidier. *Plasmonics: From Basics to Advanced Topics*, Springer Series in Optical Sciences 167, 225-268 (2012). Chapter 8 : *Imaging Surface Plasmons*
2. J. Grandidier, *Guide plasmonique polymère-métal*, Editions universitaires européennes (2010)

References

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