Elyes NEFZAOUI
ESIEE Paris School of Engineering
Dep. Sante Energie Environnement
2 Bld Blaise Pascal
93162, Noisy-Le-Grand, France
Phone : +33 1 45 92 67 56
E-mail : elyes.nefzaoui [at] esiee.fr

SHORT BIOGRAPHY

I am an assistant professor at ESIEE Paris - University Paris Est (UPE) in charge of the Energy Graduate Program of ESIEE Paris School of Engineering (100 students/year in average). I obtained my MSc. In Mechanical Engineering (French Grande Ecole ENSMA, France) in 2009 and my Ph.D. in Mechanical Engineering in 2013 (Univ. of Poitiers, France) with a dissertation on nanoscale thermal physics for thermal energy conversion and management. In 2013-2014, I served as a postdoctoral researcher at the Center of Energy and Thermal Science of Lyon (CETHIL - CNRS - INSA Lyon - Univ. Claude Bernard) before joining ESIEE Paris and UPE in 2014.

My research activities include energy conversion and management at different scales:

- Micro-scale (materials properties and micro-machined devices and sensors): I currently participate to PROTEUS project (EU-H2020 framework) which targets the design and fabrication of innovative sensor chips for water networks monitoring. I also participate to the FUI project MIMESYS targetting portable and low cost solutions for indoor air quality sensing and monitoring. Therefore, I have developed strong expertize in micro-machined sensors design and implementation. I have also raised additional funding for experimental platforms for micro structured materials characterization.
- Macro-scale (buildings, districts and cities): I have been carrying on researches on building and district energy efficiency in the framework of the R&D institute for the city energy transition, Efficacity since 2015 according to two axes : instrumentation protocols for buildings and districts monitoring and tertiary building energy consumption analysis.

RESEARCH INTERESTS

- Energy conversion and management;
- Energy efficiency in Buildings, Load disaggregation, Demand Response;
- Smart autonomous sensors for sensor networks

ACADEMIC APPOINTMENTS

Assistant Professor September 2014 – today
Head of the energy graduate program
ESIEE Paris - Univ. Paris Est

- Energy efficiency in buildings and renewable energy;
- Smart sensors and energy conversion devices;
- Meta-materials for energy;

Postdoctoral research fellow 2013 – 2014
CNRS - Center for Energy and Thermal Science of Lyon

- Thermal rectification : towards the thermal diode for heat flow control and management;

- Thermal transport modeling and computation and the micro/nano scale;

Research and Teachning assistant 2009 – 2013
Institut Pprime
CNRS - Univ. Poitiers -ENSMA
- Thermal energy harvesting by thermo-photovoltaic (TPV) devices;
- Design and optimization of thermal meta-materials for thermal energy conversion and management ;

Research assistant April – September 2009
Universidad de Santiago de Chile, Santiago, Chile
- Fluid - Granular porous media interation : the dynamics of a drop impact on a granular bed;

EDUCATION

Ph.D., Mechanical Engineering
Univ. of Poitiers, Poitiers, FRANCE 2013
THESIS - Thermo-photovoltaic devices selective emitters design and optimization

Master of Science, Mechanical Engineering
Ecole Nationale Superieure de Mecanique et d'Aerotechnique, Poitiers, FRANCE 2009

Bachelor of Science, Applied Mathematics and Physics
Institut Preparatoire aux Etudes Scientifiques et Techniques, Tunis, Tunisia 2006

TEACHING

Total of 1500 teaching hours since 2010 at Univ. of Poitiers, École Nationale Supérieure d'Ingénieurs de Poitiers (ENSIP) and ESIEE Paris - Univ. Paris Est :
- Heat and mass transfer physics;
- Applied thermodynamics;
- Photovoltaic solar energy;
- Buildings physics and energy efficiency;
- Buildings Energy Modeling (BEM);
- Experimental methods for energy efficiency and renewable energy;
- Energy harvesting for autonomous sensors;

ADVISORING

- Ph.D
  - 2018, F. J. Shaun, "Micromachined thermal flowrate sensors for a multiparametric lab-on-chip water sensor";
- M.Sc.
  - 2015, Arinaly Ralahy,"A new protocol for detailed energy and comfort auditing of non-residential buildings";
  - 2015, Soufiane Acoudad,"Energy audit methods for tertiary buildings for decentralized energy production potential assessment";
  - 2016, Hugo Regina,"Thermal optimization of micromachined resistive flowrate sensors";
  - 2017, Mathieu Bourdeau,"Instrumentation, Measurement and Analysis of power demand data of non-residential buildings";

- 2017, Sreyash Sarkar,"Design and optimization of thermal micro-machined sensors";
- 2017, Francesco Peressutti,"Dynamic behavior optimization of thermal flow rate sensors";
- 2017, Mohamed-Amine Dahaoui,"Plasmonic surface gratings based thermal meta-materials design and optimization for thermal energy harvesting ";

PUBLICATIONS

Journal articles - ongoing:

[1] M. Bourdeau, X. Guo, and E. Nefzaoui. "Buildings energy consumption generation gap: a post-occupancy assessment in a case study of three higher education buildings". accepted in Energy and Buildings. 2017.

[2] F. Shaun et al. "Micro-fabricated thermal flow-rate sensors: the substrate material impact on the device performance and power consumption". submitted to Microsystems Technologies. 2017.

[3] F. Shaun et al. "Sensitivity optimization of micro-machined thermo-resistive flow-rate sensors on silicon substrates". submitted to Journal of Michromechanics and Microengineering. 2017.

Journal articles - published:

[1] Y. Allab et al. "Energy and comfort assessment in educational building: Case study in a French university campus". In: *Energy and Buildings* 143 (2017). cited By 2, pp. 202–219.

[2] E. Nefzaoui et al. "Radiative thermal rectification using superconducting materials". In: *Applied Physics Letters* 104.10 (2014). cited By 19.

[3] E. Nefzaoui et al. "Simple far-field radiative thermal rectifier using Fabry-Perot cavities based infrared selective emitters". In: *Applied Optics* 16 (2014). cited By 9, pp. 3479–3485.

[4] E. Nefzaoui et al. "Maximal near-field radiative heat transfer between two plates". In: *EPJ Applied Physics* 63.3 (2013). cited By 5, 30902–p1–30902–p12.

[5] E. Nefzaoui, J. Drevillon, and K. Joulain. "Selective emitters design and optimization for thermophotovoltaic applications". In: *Journal of Applied Physics* 111.8 (2012). cited By 15.

[6] E. Nefzaoui and O. Skurtys. "Impact of a liquid drop on a granular medium: Inertia, viscosity and surface tension effects on the drop deformation". In: *Experimental Thermal and Fluid Science* 41 (2012). cited By 23, pp. 43–50.

[7] J. Drevillon et al. "Far field coherent thermal emission from a bilayer structure". In: *Journal of Applied Physics* 109.3 (2011). cited By 17.

Talks and conference proceedings:

[1] I. Azzouz et al. "Evaluation of Tenax thin films as adsorbent material in a micro-preconcentrator and its operation as a valve-less multiple injection system in micro-gas chromatography". In: *TRANSDUCERS 2017 - 19th International Conference on Solid-State Sensors, Actuators and Microsystems*. 2017, pp. 1516–1519.

[2] E. Nefzaoui and P.-O. Chapuis. "Ballistic effects on thermal conductivity in 1D and 2D configurations from single and multiple localized sub mean free path heat sources: a numerical investigation". In: *2017 MRS Spring Meeting*. Phoenix, United States, Apr. 2017.

[3] F. Shaun et al. “Design of micro-fabricated thermal flow-rate sensor for water network monitoring”. In: *Symposium on Design, Test, Integration and Packaging of MEMS/MOEMS, DTIP 2017*. 2017.

[4] F. Shaun et al. “On the co-integration of a thermo-resistive flow-rate sensor in a multi-parameter sensing chip for water network monitoring”. In: *TRANSDUCERS 2017 - 19th International Conference on Solid-State Sensors, Actuators and Microsystems*. 2017, pp. 1069–1072.

[5] Y. Allab et al. “L’éfficacité énergtique des bâtiments existants: le cas d’étude d’un campus universitaire franais”. In: *International Building Performance Simulation Association*. Champs-sur-Marne, France, May 2016.

[6] P.-O. Chapuis et al. “Thermal transport phenomena beyond the diffusive regime”. In: *Proceedings of the 23rd International Conference Mixed Design of Integrated Circuits and Systems, MIXDES 2016*. 2016, pp. 32–37.

[7] E. Nefzaoui and P.-O. Chapuis. “Ballistic effects on in-plane and cross-plane thermal conductivity in 1D and 2D configurations: a numerical investigation”. In: *Eurotherm 108: Nanoscale and Microscale Heat Transfer V*. Oral presentation at International Eurotherm 108: Nanoscale and Microscale Heat Transfer V. Santorini, Greece, Sept. 2016.

[8] W. Jaber et al. “Phonon heat conduction from silicon sub-mean free path sources measured with electrical means”. In: *Phonons 2015 (15th International Conference on Phonon Scattering in Condensed Matter)*. Nottingham, United Kingdom, July 2015.

[9] W. Jaber et al. “Thermal conductances of silicon sub-mean free path heat sources measured with a four-probe electrical setup”. In: *MRS Spring meeting, Symposiumm on Nanoscale Heat Transfer From fundamentals to devices*. San Francisco, United States, Apr. 2015.

[10] E. Nefzaoui et al. “Phonon confinement analyzed with the Boltzmann transport equation solved by the discrete ordinates method in 1D and 2D configurations”. In: *Phonons 2015 (15th International Conference on Phonon Scattering in Condensed Matter)*. Nottingham, United Kingdom, July 2015.

[11] E. Nefzaoui et al. “Tunable Radiative Thermal Rectifiers : Toward Thermal Logical Circuits”. In: *The 15th International Heat Transfer Conference (IHTC-15)*. Kyoto, Japan, Aug. 2015.

[12] J. Drevillon et al. “Radiative thermal rectification using superconducting materials”. In: *Eurotherm 103 : Nanoscale and Microscale Heat Transfer IV*. Lyon , France, Oct. 2014.

[13] E. Nefzaoui and P.-O. Chapuis. “A comparative study of different numerical approaches to the boltzmann transport equation for phonons”. In: *Eurotherm 103 : Nanoscale and Microscale Heat Transfer IV*. Lyon , France, Oct. 2014.

[14] E. Nefzaoui et al. “Photonics for Radiative Thermal Rectification”. In: *E-MRS Spring Meetings*. Lille , France, May 2014.

[15] E. Nefzaoui et al. “Propositions pour la rectification thermique radiative en champ lointain”. In: *8me Journes dEtudes en Rayonnement Thermique*. Lyon, France, 2014.

[16] E. Nefzaoui et al. “On Maximal near-field radiative heat transfer”. In: *Nanoenergy 2013*. Perugia, Italy, July 2013.

[17] E. Nefzaoui et al. “Sur le transfert radiatif maximal en champ proche entre deux plans”. In: *7me Journes dEtudes en Rayonnement Thermique*. Nantes, France, Mar. 2013.

[18] E. Nefzaoui et al. “On optimal optical properties for near-field radiative heat transfer maximization between two semi-infinite planes at room temperature”. In: *RAD-13. Proceedings of the 7th International Symposium on Radiative Transfer*. Kusadasi, Turkey: Begel House Inc., June 2013.

[19] I. Bogatyrev et al. “Thermophotovoltaic cell performance improving by thermal losses optimization”. In: *International Conference on Nanoscience + Technology (ICN+T2012)*. Paris, France, July 2012.

[20] J. Drvillon, E. Nefzaoui, and K. Joulain. “Selective emitters design and optimization for thermophotovoltaic applications”. In: *phonons and fluctuations 3*. Sant Feliu de Guixols, Girona, Spain, May 2012.

[21] J. Drvillon et al. “Selective emitters design for thermophotovoltaics”. In: *3rd International Conference on Metamaterials, Photonics Crystals and Plasmonics*. Paris, France, Apr. 2012.

[22] J. Drevillon et al. “Optimization and Simplification of Spectrally Coherent Thermal Sources”. In: *MRS Spring Meetings*. San Francisco, United States, Apr. 2011.

[23] E. Nefzaoui, J. Drevillon, and K. Joulain. “1D selective emitters optimization for TPV application”. In: *Eurotherm 91 : Microscale heat transfer III*. Poitiers, France, Aug. 2011.

[24] E. Nefzaoui, J. Drevillon, and K. Joulain. “Conception et optimisation d’metteurs slectifs pour applications thermophotovoltaques”. In: Perpignan, France, May 2011.

[25] E. Nefzaoui, J. Drevillon, and K. Joulain. “Nanostructures thermal emission optimization using genetic algorithms and particle swarms”. In: *ICEC 2010 - Proceedings of the International Conference on Evolutionary Computation*. 2010, pp. 219–224.

[26] E. Nefzaoui and O. Skurtys. “Water drop impact on a granular medium”. In: *Southern Workshop on Granular Materials 2009 - SWGM09*. Vina del Mar, Chile, Nov. 2009.

GRANTS AND FUNDING

CEMIP, Platform for electronics cooling using nano/micro-materials	2016
CEMIP, Platform for micro-structured thermal meta-metarials characterization	2015
EFFICACITY, Non-residential buildings energy efficiency assessment innovative protocol	2015
FRENCH GOVERNMENT, Grant as Reasearch & Teaching assistant in U. Poitiers	2009-12
POITOU-CHARENTE REGION, Grant as reasearch assistant in Univ. Santiago de Chile	2009
TUNISIAN GOVERNMENT, Full merit scholarship for MSc in Mechanical Engineering	2006-09

LANGUAGES

English : fluent, **Spanish :** fluent, **German :** basic, **French :** native / bilingual, **Arabic :** native

INTERESTS

Piano accordion, Running, Reading,