

Mukesh Kumar Kulsreshath

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PRESENT WORK

Postdoc fellow at GREMI lab., Universite d'Orleans, France

(From Mar. 2016)

- Work on the realization of 3D capacitor using MEMS/CMOS based fabrication techniques
- Work at the cleanroom facility of STMicroelectronics (CERTeM)

EDUCATION

Ph.D. in Plasma Physics Engineering

2009 - 2013

Institute: GREMI, University d'Orleans, Orleans, France and in collaboration with RUB, Bochum, Germany.

Ph.D. Thesis title: "Development and study of micro-discharges on silicon".

Ph.D. Supervisor: Dr. Remi Dussart

Erasmus Mundus Master of Science in Photonics (1st Class)

2006-2008

Institutes: University of Ghent, Ghent and VUB, Brussels, Belgium (2007-2008); University of St Andrews, St. Andrews and Heriot Watt University, Edinburgh, U.K (2006-2007).

Master Thesis title: "Design and fabrication of an integrated receiver for fiber to the home (FTTH) optical networks" (2007-2008)

Master of Science in Physics (1st Class)

2001-2003

Institute: Guru Nanak Dev University, Amritsar (Punjab), India.

Bachelor of Science (Computer Science and Applications) (1st Class)

1997-2000

Institute: Panjab University, Chandigarh, India.

ADDITIONAL EDUCATION QUALIFICATIONS

Master of Education (1st Class)

2005- 2006

Institute: Panjab University, Chandigarh.

Thesis title: "An insight into career opportunities in the field of Physics"

ACADEMIC HONORS

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| • Eyes High Postdoc Fellowship – University of Calgary, Canada | 2015-2016 |
| • PROCOPE fellowship (common grant of French and German govt. in R&D) | 2010-2012 |
| • CNRS fellowship for PhD in France | 2009-2012 |
| • Marie Curie early researcher fellowship from European Commission | 2008-2009 |
| • Erasmus Mundus postgraduate fellowship from European Commission | 2006-2008 |

AREA OF RESEARCH EXPERIENCE

MEMS/CMOS based fabrication technologies, CADENCE/PSPIICE circuit simulations, RF based circuit designs, High pressure plasma, microdischarges/micro-plasmas, low pressure plasmas, plasma kinetics, plasma chemistry, dry etching, wet etching, Flip-chip bonding and packaging, thin film deposition (PECVD), electrochemical metal deposition, CAD based mask designs of different types of sensors, optical spectroscopy, Photonics integrated circuits on SOI, laser, optical fiber communication, LED/LCD devices, THz sensing and detection, electronics circuits based simulations, high voltage characterisation, MEMS based sensors and nano-micro thermal photovoltaic technology.

JOURNAL PUBLICATIONS *(*details can be provided on request)*

- 8 international journal articles
- 3 international conference proceeding article
- 27 international conference communications

LANGUAGES KNOWN

English (Professional), Hindi (Native), French (Intermediate), Punjabi (Native)

RESEARCH/ACADEMIC/INDUSTRIAL PROJECTS EXPERIENCE

- 2015 - 2016 **Postdoctoral Research Associate (Eyes High Fellowship), University of Calgary, Canada (From Feb. 2015 – Feb. 2016)**
*Micro/Nano Technologies (MiNT) Laboratory | www.ucalgary.ca/lbelosto/research_pub, Dept. of Electrical and Computer Engineering
- Worked on THz detection techniques for Earth based telescopes
 - Design and Fabrication of six-port CMOS based integrated receiver for THz coming from cosmos with 65 nm CMOS technology
 - Design of all pass filter using 130 nm technology in Cadence
 - MEMS and microelectronics based circuit simulations (Cadence, PSPICE...)
 - MEMS/CMOS based fabrication
- 2013 - 2014 **Postdoctoral Research Associate, University of Nebraska Lincoln, USA (From April 2013 - Dec. 2014)**
*Nano & Microsystems Research Laboratory (NMRL) | <http://nmrl.unl.edu>, Mechanical and Material Engineering
- Worked on Micro Solar Thermal Photovoltaic Technology
 - Worked on the concepts of heat-transfer systems at near-field
 - COMSOL simulations for heat transfer
 - Established the labs for the electrical characterisation of thermal photovoltaic cells
 - Developed the novel experimental processes for the MEMS/CMOS based fabrication of the devices at CNF-Cornell University, Ithaca, New York, USA
 - Fabrication included extensive experience with i-line and DUV steppers, plasma dry etching of silicon wafers with very thick oxide layers for the realization of MEMS based devices
 - Worked on the side project of microfluidics device fabrication
- 2012- 2013 **Postdoctoral Researcher at GREMI*, Orleans, France (From Dec. 2012 – Mar. 2013)**
*Groupe de Recherches sur l'Energétique des Milieux Ionisés, www.univ-orleans.fr/gremi
- Design and fabrication of micro-discharge reactors using CMOS technology under standard cleanroom facilities of **STMicroelectronics (CERTeM), Tours** and **IEF-CTU, Orsay** in France.
- 2009- 2012 **PhD thesis research based on Plasma Physics Engineering at GREMI*, Orleans, France (From Dec. 2009 – Nov. 2012)**
*Groupe de Recherches sur l'Energétique des Milieux Ionisés, www.univ-orleans.fr/gremi
- Thesis title: Development and study of micro-discharges on silicon.
 - Experience: Design and fabrication of micro-discharge reactors using CMOS technology under standard cleanroom facilities of **STMicroelectronics, Tours** and **IEFCTU, Orsay** in France.
 - Management and teaching: Status of PhD teacher researcher (64 hrs/ year). Activities include management of internship projects offered by Polytech of Orleans and teaching for 3rd, 4th and 5th year engineering students. Management of scientific project of PhD.
 - International collaborations and activities: Research work in collaboration with different universities, mainly with **RUB, Bochum, Germany** and **UTD, Dallas, USA**. Presentation of research work in many national and international conferences
- 2008-2009 **Research engineer at LGEP/SUPELEC*, Gif-sur-Yvette, France (From Nov. 2008 – Nov. 2009)**
*Laboratoire de Génie Electrique de Paris, www.lgep.supelec.fr
- Project title: Fabrication and study of room temperature micro-bolometers for THz detection.

- Experience: Design and fabrication of semiconductor based micro-bolometers using MEMS technology under standard cleanroom environment. Characterisation at room temperature and cryogenic environment.

2007-2008 **Master thesis in Photonics, University of Ghent*, Ghent, Belgium**
(From Sept. 2006 – July 2008)

* www.photonics.intec.ugent.be

- Project title: Design and fabrication of an integrated receiver for fiber to the home (FTTH) optical networks.
- Experience: Simulation, designing and fabrication of FTTH receiver using micro-photonics technology on SOI platform including photonics waveguide integrated circuits under standard cleanroom facilities.

2007 (1 month) **Postgraduate intern in BARCO*, Kuurne, Belgium**
(From Jul. 2007 – Aug. 2007)

* www.barco.com

- Project title: Study of the response time for different LCD technologies.
 - Experience: Study of different types of projectors based on different LCD based technologies. Design software based on Visual Basic to study and analyse the LCD response time in relation to human vision.

2004-2005 **Lecturer in Physics, D.A.V. Public School*, Malout, Punjab (India)**
(From Aug. 2004 – Mar. 2005)

* www.davschoolmalout.com

- Teaching of high school physics courses
- Management of school curriculum
- Management of school experimental physics labs

2003-2004 **Lecturer in Physics, D.A.V. College*, Abohar, Punjab (India)**
(From Aug. 2003 – Mar. 2004)

* www.davcollegeabohar.com

- Teaching of undergraduate physics courses
- Demonstrated and supervised physics lab. Experiments

Publications & communications

1. Journal paper, "Fabrication and Characterization of a High Temperature Monolithic Microdevice as a Potential Platform for Near-Field Heat Transfer Measurement", Mukesh Kumar Kulsreshath, Mahmoud Elzouka and Sidy Ndao, IEEE Journal of Microelectromechanical Systems (under review).
2. Journal paper, "Circular Emission and Destruction Patterns on a Silicon-Based Microdischarge Array", Judith Golda, Mukesh Kulsreshath, Henrik Boettner, Valentin Felix, Remi Dussart, and Volker Schulz-von der Gathen, IEEE Transactions on Plasma Science 42 (10) (Oct. 2014)
3. Journal paper, "Ignition dynamics of dry-etched vertical cavity single hole microdischarge reactors in AC regime operating in noble gases", Mukesh Kumar Kulsreshath; Judith Golda; Valentin Felix; Volker Schulz-von der Gathen; Remi Dussart, J. Phys. D: Appl Physics 47 (33) (2014)
4. Journal paper, "Width-dependent interaction of trench-like microdischarges arranged in sub-arrays on a single silicon-based chip", M K Kulsreshath, J Golda, V Schulz-von der Gathen and R Dussart, Plasma Sources Sci. Technol. 23 045012 (2014)
5. Journal Paper, "Ignition and extinction phenomena in helium micro hollow cathode discharges", M. K. Kulsreshath, N. Sadeghi, L. Schwaederle, T. Dufour, L. J. Overzet1, P. Lefauchaux and R. Dussart, Journal of Applied Physics (Vol.114, Issue 24) (2013)
6. Journal Paper, "Study of DC micro-discharge arrays made in silicon using CMOS compatible technology", Mukesh Kulsreshath, Laurent Schwaederlé, , L.J. Overzet, P. Lefauchaux, J. Ladroue, T. Tillocher, O. Aubry, M. Woytasik, G. Schelcher, R. Dussart, J. Phys. D: Appl. Phys. 45, 285202 (2012)
7. Journal paper, "Breakdown study of dc silicon micro-discharge devices", Laurent Schwaederlé, Mukesh Kulsreshath, Lawrence Overzet, Philippe Lefauchaux, Thomas Tillocher, Remi Dussart, Journal of Physics D: Applied Physics, 45, 065201 (2012)
8. Journal paper, "Experimental study and simulation of a micro-discharge with limited cathode area" T. Dufour, L.J. Overzet, R. Dussart, L.C. Pitchford, N. Sadeghi, P. Lefauchaux, M. Kulsreshath and P. Ranson, Eur. Phys. J. D 60, 565–574 (2010)
9. Journal paper, "Integrated micro-plasmas in silicon operating in helium", R. Dussart, L.J. Overzet, P. Lefauchaux, T. Dufour, M. Kulsreshath, M.A. Mandra, T. Tillocher, O. Aubry, S. Dozias, P. Ranson, J.B. Lee, and M. Goeckner, Eur. Phys. J. D, 60 (2010)
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10. Conference proceedings journal paper, "Modeling of near-field concentrated solar thermo. PV microsystem", Mahmoud Elzouka, Mukesh K. Kulsreshath and Sidy Ndao, Montreal, Quebec, Canada, IMECE2014, November 14-20 (2014)

11. Conference proceedings journal paper, "Broadband dielectric and IR pyroelectric response of amorphous Y-Ba-Cu-O oxygen depleted thin films", A Gensbittel, A F Dégardin, O Dubrunfaut, M K Kulsreshath, V S Jagtap and A J Kreisler, IOP Conf. Series: Materials Science and Engineering, 41, 012013 (2012)
 12. Conference proceedings journal paper, "Migrating from superconducting to semiconducting YBCO thin film bolometers as future far-infrared imaging pixels", Vishal S. Jagtap, Mattia Longhin, Mukesh K. Kulsreshath, Alain J. Kreisler, and Annick F. Dégardin, SUPELEC, LGEP, CNRS, Univ. Paris Sud 11 (France), Proc SPIE 04/2010
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Conference oral/poster Communications

1. "Spectroscopic investigations of transient processes in micro-cavity discharge reactors", V. Schulz-Von Der Gathen, Judith Golda, Daniel Schröder, H. Boettner, Arthur Greb, Jochen Waskoenig, Mukesh Kulsreshath, Valentin Felix, Remi Dussart, International Symposium on Non-equilibrium Plasmas and Complex Systems, Osaka, Japan (26/02/2014)
2. "RF Diagnostics of Microplasmas", Valentin Felix, Remi Dussart, Mukesh Kulsreshath, Philippe Lefauchaux, Volker Schulz von der Gathen, Judith, Lawrence J. Overzet, 7th International Workshop on Microplasmas, Pekin, China, May 2013
3. "On Causes of the Destruction of MHCD Sources During Operation". Lawrence J. Overzet, Valentin Felix, Remi Dussart, Philippe Lefauchaux, Mukesh Kulsreshath, V. Schulz-Von Der Gathen, Judith Golda, 7th International Workshop on Microplasmas, Pekin, China, May 2013
4. "Spectroscopic Diagnostics of Ceramic MHCDs", Judith Golda, V Schulz-von der Gathen, Valentin Félix, Remi Dussart, Philippe Lefauchaux, Mukesh Kulsreshath, Lawrence J. Overzet, International Workshop on Microplasmas, Pekin, China, May 2013
5. "Radio Frequency Diagnostics of Microplasmas", Lawrence J. Overzet, Matthew Goeckner, Remi Dussart, Philippe Lefauchaux, Valentin Félix, Mukesh Kulsreshath, Judith Golda, V. Schulz-Von Der Gathen, Frontiers in Low Temperature Plasma Diagnostics , Kerkrade Netherlands, March 2013
6. "Development and limitations of microplasma arrays on silicon operating in DC", Remi Dussart , Mukesh Kulsreshath, Laurent Schwaederlé, Valentin Felix, Philippe Lefauchaux, Olivier Aubry, Thomas Tillocher, Sebastian Dozias , Lawrence J. Overzet, AVS 59th International Symposium and Exhibition United States, October 2012
7. "Development of microdischarge arrays in silicon operating in DC and AC", M. K. Kulsreshath, L. Schwaederle, L. J. Overzet, T. Tillocher, S. Dozias, V. Felix, P. Lefauchaux, O. Aubry, V. Schulz-von der Gathen, R. Dussart, 39th European Physical Society Conference on Plasma Physics / 16th International Congress on Plasma Physics (EPS/ICPP), Stockholm, Sweden, 2-6 July 2012

8. "Development of microdischarges in silicon operating in DC for medical applications", Mukesh Kulsreshath, Laurent Schwaederle, Lawrence Overzet, Thomas Tillocher, Sebastien Dozias, Valentin Felix, Philippe Lefauchaux, Olivier Aubry, Rémi Dussart, 4th International Conference on Plasma Medicine (ICPM4), Orleans, France, 17th – 21st June 2012
9. "Integrated microplasmas on silicon: a new tool for lab-on-a-chip applications", Remi Dussart, Mukesh Kulsreshath, Valentin Felix, Lawrence J. Overzet, Thomas Tillocher, Philippe Lefauchaux, Cancer Cells On Chip, Lyon, France, 11th June 2012
10. "Development and characterization of microplasma arrays on Silicon", Remi Dussart, Thierry Dufour, Mukesh Kulsreshath, Valentin Felix, Laurent Schwaederlé, Philippe Lefauchaux, Thomas Tillocher, N. Sadeghi, L.C. Pitchford, V. Schulz-Von Der Gathen, Lawrence J. Overzet, International Workshop on Physics of Microplasmas, Bochum, Germany, 30th May 2012
11. "Caractérisation de matrices de micro plasmas sur silicium", M.Kulsreshath, L. Schwaederlé, V. Félix, P. Lefauchaux, T. Tillocher, H. Boettner, V. Schulz-von der Gathen, L. J. Overzet, O. Aubry, S. Dozias, R. Dussart, P. Ranson, 12ÈME CONGRES DE LA DIVISION PLASMAS DE LA SFP, Orléans, France, 22nd – 24th May 2012
12. "Microplasma reactor arrays made in silicon", M. Kulsreshath, L. Schwaederlé, P. Lefauchaux, H. Boettner, V. Schulz-von der Gathen, L.J. Overzet, R. Dussart, The 18th International Colloquium on Plasma Processes (CIP), Nantes, France, 4th – 8th July 2011
13. "Generation of stable high-pressure glow discharges using Si integrated microreactors", L. Schwaederlé, M. Kulsreshath, L.J. Overzet, P. Lefauchaux, O. Aubry, S. Dozias, P. Ranson, R. Dussart, The 18th International Colloquium on Plasma Processes (CIP), Nantes, France, 4th – 8th July 2011
14. "Deep etching of bulk titanium by plasma", T. Tillocher, J. Ladroue, W. Kafrouni, M. Kulsreshath, P. Lefauchaux, H. Viatgé, P. Ranson, R. Dussart, The 18th International Colloquium on Plasma Processes (CIP), Nantes, France, 4th – 8th July 2011
15. "Deep etching of bulk titanium with SF₆ and Cl₂ chemistries", Thomas Tillocher, Julien Ladroue, Mukesh Kulsreshath, Wassim Kafrouni, Philippe Lefauchaux, Hélène Viatgé, Pierre Ranson, Rémi Dussart, Plasma etch and strip in microelectronics- 4th international workshop (PESM2011), Michelen, Belgium, 5th – 6th May 2011
16. "Characterisation of silicon based micro discharge plasma arrays in Direct Current (DC) at atmospheric pressure", M. Kulsreshath, L. Schwaederle, P. Lefauchaux, T. Tillocher, J. Ladroue, O. Aubry, P. Ranson, L. Overzet, R. Dussart., International Workshop on Microplasmas 6 (IWM6) Paris, France, 3rd - 6th April 2011
17. "Microcathode sustained discharges using Si integrated micro-discharges arrays", L. Schwaederle, M. Kulsreshath, L.J. Overzet, P. Lefauchaux, R. Dussart, International Workshop on Microplasmas 6 (IWM6) Paris, France, 3rd - 6th April 2011

18. "Characterization of the ignition and the extinction of a Micro Hollow Cathode Discharge", R. Dussart, N. Sadeghi, L. J. Overzet, M. Kulsreshath, L. Schwaederlé, P. Lefauchaux, O. Aubry, P. Ranson, International Workshop on Microplasmas 6 (IWM6) Paris, France, 3rd - 6th April 2011
19. "CMOS compatible technology for fabrication of micro-discharge sources", M. Kulsreshath and R. Dussart et al. JNTE'10, Paris, France, 24th - 26th Nov. 2010
20. "Micro-discharge plasma using silicon platform", M. Kulsreshath, T. Dufour, P. Lefauchaux, O. Aubry, S. Dozias, P. Ranson, J. B. Lee, M. Goeckner, L. J. Overzet, R. Dussart, AVS 57th international symposium & exhibition, Albuquerque, NM, USA, 17TH – 22nd October 2010
21. "Ignition and extinction of a Micro Hollow Cathode Discharge operating in DC regime", R. Dussart, M. Kulsreshath, T. Dufour, N. Sadeghi, L. J. Overzet, P. Lefauchaux, T. Tillocher, O. Aubry, S. Dozias, P. Ranson, M. J. Goeckner, J. B. Lee, AVS 57th international symposium & exhibition, Albuquerque, NM, USA, 17TH – 22nd October 2010
22. "Micro hollow cathode discharge arrays in silicon devices", R. Dussart and M. Kulsreshath et al., 63rd GEC, Paris, France, (Oct. 2010)
23. "Fabrication and electrical characterization of Direct Current (DC) micro discharges", M. Kulsreshath et al., Plasmas Froid Québec-France, June 2010
24. "Study of an MHCD operating in He using optical and electrical diagnostics", R. Dussart, T. Dufour, T. Tillocher, M. Kulsreshath, O. Aubry, S. Dozias, P. Lefauchaux, P. Ranson, J. B. Lee, M. Goeckner, N. Sadeghi, L. J. Overzet, Diagnostics Microplasmas, Bochum, Germany, 21-23 mars 2010.
25. "Migrating from superconducting to semiconducting YBCO thin film bolometers as future far-infrared imaging pixels", Vishal S. Jagtap, Mattia Longhin, Mukesh K. Kulsreshath, Alain J. Kreisler, and Annick F. Dégardin, Terahertz Physics, Devices, and Systems IV: Advanced Applications in Industry and Defense, Orlando, Florida, USA, 5 April 2010
26. "Superconducting and semiconducting YBCO thin film bolometers: pathways to future far-infrared imagers", V S Jagtap, M Longhin, M K Kulsreshath, A J Kreisler and A F Dégardin, The 9th European Conference on Applied Superconductivity, EUCAS 2009, Dresden, Germany, September 13-17, 2009
27. "Uncooled semiconducting YBCO based thin film bolometers for active THz imaging", M.K. Kulsreshath, Meng Wang, 2nd European Summer School on New Trends in Terahertz Imaging (NTTI 2009), Paris : France (June 2009)
28. Conference poster presentation with my group of LGEP-SUPELEC on 05th February, 2009 at UPMC-6, Paris in Marie Curie European commission meeting