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The 1st International Workshop on Plasma for Cancer Treatment

IWPCT2014 Technical Program

**March 25, 2014**

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| **Welcome / Introduction Session Chairs: M. Laroussi & M. Keidar** | |
| 8:00 - 8:30 | Welcome Remarks by:  Dean David Dolling SEAS/VPR Leo Chalupa, GWU Dean Oktay Baysal, ODU |

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| **Oral Session 1: Plasma - Cell and Plasma - Tissue Interaction Session Chair: M. Laroussi, Old Dominion University, Norfolk, VA, USA** | |
| 8:30 - 9:30 | **Plasma Treatment of Complex Tissues**, K. Masur12, S. Hasse12, K. Wende12, A. Schmidt12, K. D. Weltmann2, T. von Woedtke2 1 Center of Innovation Competence plasmatis - 17489 Greifswald, Germany 2 Leibniz Institute for Plasma Science and Technology (INP Greifswald), Felix-Hausdorff-St 2, 17489 Greifswald, Germany |
| 9:00 - 9:30 | **DNA and Protein Degradation Induced by Atmospheric Pressure Microplasma Jets**, P-M Girard1, M. Bitu1, L. Tessier1, C. Douat2, J. Santos-Sousa2, G. Bauville2, M. Fleury2, V. Puech2 1 Institut Curie, CNRS UMR3348, Orsay, France 2 Laboratoire de Physique des Gaz et des Plasma, CNRS and Univ. Paris-Sud, Orsay, France |
| 9:30 - 10:00 | **Future Perspective of Strategic Plasma Therapy for Refractory Epithelial Ovarian Cancer**, H. Kajiyama, K. Nakamura, F. Utsumi, H. Tanaka, M. Hori, F. Kikkawa 1 Nagoya University, Nagoya, Japan |
| 10:00 - 10:20 | Morning Coffee Break |

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| **Oral Session 2: Cancer Treatment and Animal Studies Session Chair: S. Reuter, INP, Greifswald, Germany** | |
| 10:20 - 10:50 | **Clinical Application of Hybrid and Cold Atmospheric Plasma Technology in Surgery: A New Approach to the Eradication of Cancer**, J. Canady1, K. Wiley1, A. Shashurin2, M. Keidar2, T. Zhuang1, M. Kanaan1, E. Jung1, S. Wigh1, B. Trink3 1 Department of Plasma and biomedical Engineering, Jerome Canady Institute for Advanced Biological and Technical Science, Plasma Medicine Life Science, Takoma Park, MD, USA 2 Department of Mechanical and Aerospace Engineering, The George Washington University, Washington, DC, USA 3 Department of Otolaryngology Head and Neck surgery, Rambam Medical Center, Haifa, Israel |
| 10:50 - 11:20 | **On the Various Strategies for Cancer Treatment with the Plasma Gun**, E. Robert1, M. Vandamme1, G. Collet12, C. Kieda2, J. M. Pouvesle1 1 GREMI UMR 7344 CNRS-Universite d' Orleans, France 2 CBM UPR 4301 CNRS Orleans, France |
| 11:20 - 11:50 | **Utility of Plasma Devices to Treat Cancer**, N. Barekzi and M. Laroussi 1 Laser and Plasma Engineering Institute, Old Dominion University, Norfolk, VA, USA |
| 11:50 - 1:00 | Lunch & ISC luncheon meeting |
| 1:00 - 2:30 | Poster Session (see list of papers at the end of this document) |
| 2:30 - 3:00 | Afternoon Coffee Break |

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| **Oral Session 3: Modeling of Plasma Tissue Interactions Session Chair: M. Keidar, George Washington University, Washington DC, USA** | |
| 3:00 - 3:30 | **Reactive Species from Air Plasma: Implications for Therapeutic Applications**, D. B. Graves 1 University of California Berkeley, Berkeley, CA, USA, 94720 |
| 3:30 - 4:00 | **Modeling of Plasma-Biomolecule Interactions for a Better Understanding of Plasma medicine**, A. Bogaerts, M. Yusupov, J. V. der Paal, C. Verlackt, E. Neyts 1 University of Antwerp, Research group PLASMANT, Belgium |
| 4:00 - 4:30 | **Plasma Assisted Drug Delivery - The Oncologist View**, J. Schlegel1, V. Boxhammer1,2, J. Koritzer1,2, J. Zimmermann2 1 Division of Neuropathology, Institute of Pathology, Technische Universitat Munchen 2 Max-Planck Institute of Extraterrestrial Physics |

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| **Oral Session 4: Destruction of Cancer Cells by Low Temperature Plasmas Session Chair: X. Lu, Huazhong University of Science and Technology, Wuhan, China** | |
| 4:30 - 5:00 | **The Effect of Differing Cold Plasma Composition on Glioblastoma Cell Viability**, X. Cheng1, J. Sherman2, W. Murphy3, E. Ratovitski1,4, J. Canady5, M. Keidar1 1 Department of Mechanical and Aerospace Engineering, The George Washington University 2 Department of Neurological Surgery, The George Washington University 3 Department of Electrical and Computer Engineering, The George Washington University 4 Head and Neck Cancer Research Division, John Hopkins University School of Medicine 5 Department of Plasma and biomedical Engineering, Jerome Canady Institute for Advanced Biological and Technical Science, Plasma Medicine Life Science, Takoma Park, MD, USA |
| 5:00 - 5:30 | **Low Temperature Plasma Treatment of Prostate Cancer Cell Lines and Primary Cells**, A. M. Hirst1, F.M. Frame2, N. J. Maitland2, D. O'Connell1 1 York Plasma Institute, Department of physics, University of York, UK 2 YCR Cancer Research Unit, Department of Biology, University of York, UK |
| 5:30 - 6:00 | **Antineoplastic Effects of Nonthermal Plasma**, V. Miller1, D. Dobrynin1, G. Fridman1, A. Brooks2, A. Fridman1 1 AJ Drexel Plasma Institute, Drexel University, Philadelphia, PA, USA 2 Endocrine and Oncologic Surgery, Pennsylvania Hospital, Philadelphia, PA |
| 7:00 - 7:30 | Reception |
| 7:30 - 9:30 | Dinner |

**March 26, 2014**

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| **Oral Session 5: Plasma - Cell and Plasma - Tissue Interaction Session Chair: A. Bogaerts, University of Antwerp, Antwerp, Belgium** | |
| 8:00 - 8:30 | **Differential Death of Human Lung Cancer (H460) and Normal Lung Cancer (L132) in the Biosolutions by Nonthermal Atmospheric Pressure Plasma**, E. H. Choi, Y. H. Kim, Y. J. Hong, K. Y. Baik, K. Panngom, H. S. Uhm 1 Plasma Bioscience Research Center, Kwangwoon University, Seoul,139-701, Korea |
| 8:30 - 9:00 | **Selective Neuronal Differentiation of Neural Stem Cells Induced by C-APPJ**, X. Lu1, Z. Xiong1, S. Zhao2, G. Y. He2 1 State Key Laboratory of Advance Electromagnetic Engineering and Technology, Huazhong University of Science and Technology, Wuhan, Hubei 430030, P. R. China 2 College of Life Science and Technology, Huazhong University of Science and Technology (HUST), Wuhan, Hubei 430074, P. R. China |
| 9:00 - 9:30 | **Intracellular Molecular Mechanisms of Apoptosis in Cancer Cells by Plasma-Activated Medium**, H. Tanaka1, M. Mizuno1, K. Ishikawa1, K. Takeda1, K. Nakamura1, F. Utsumi1, H. Kajiyama1, H. Kano2, Y. Okazaki1, S. Toyokuni1, S. Maruyama1, F. Kikkawa1, M. Hori1 1 Nagoya University 2 NU-Eco Engineering |
| 9:30 - 10:00 | Coffee Break |

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| **Oral Session 6: Plasma Sources Used in Cancer Research Session Chair: D. O' Connell, University of York, UK** | |
| 10:20 - 10:50 | **The Challenge of Plasma Diagnostics in Plasma Medicine: From Plasma to Liquids to Cells**, S. Reuter1, H. Tresp1, J. Winter1, M. Hammer1, A. Schmidt-Bleker1, S. Iseni1, M. Dunnbier1, K. Masur1, A. Barton1, K. Wende1, Th. von Woedtke2, K. -D. Weltmann2 1 Center for Innovation Competence (ZIK) plasmatis at the INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany 2 Leibniz Institute for Plasma Science and Technology (INP Greifswald e.V.), Felix-Hausdorff-Strasse 2, 17489, Greifswald, Germany |
| 10:50 - 11:20 | **Physical, Chemical, and Biological Aspects of Helium Based kHz Plasma Jets**, W. G. Graham 1 Center for Plasma Physics, Queen's University, Belfast, Northern Ireland, UK |
| 11:20 - 11:50 | **Plasma Cancer Endoscopy and Therapy**, S-O. Kim 1 Holcombe Department of Electrical and computer Engineering, Center for Optical Materials Science and Engineering Technologies (COMSET), Clemson University, Clemson, SC, USA, 29634 |

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| **Discussion Session Moderators: M. Laroussi, M. Keidar, A. Bogaerts, D. Graves, S. Reuter, W. Graham** | |
| 11:30 - 12:15 | General Discussion |
| 12:15 - 12:30 | Closing Note |

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| **Poster Session** | |
| **Cold Plasma Facilitates Oxidative and Nitrative Stress and Endoplasmic Reticulum Stress Dependent Apoptosis**, S. Zhao1, X. Lu2, Z. Xiong2, G. Y. He1 1 College of Life Science and Technology, Huazhong University of Science and Technology (HUST), Wuhan, 430074, P. R. China 2 State Key Laboratory of Advance Electromagnetic Engineering and Technology, Huazhong University of Science and Technology, Wuhan, Hubei 430030, P. R. China |  |
| **Organotypic Slice Cultures as a Model for the Investigation of Plasma Selectivity in Brain Tissue**, J. Koritzer1, V. Boxhammer1, A. Steiner-Mezzadri2, G. A. Pilz2, M. Gotz2, J. Schlegel3, J. L. Zimmermann2 1 Max-Planck Institute for Extraterrestrial Physics, Giessenbachstr, Garching Germany 2 Institute of Stem Cell Research, Helmholtz Centre Munich, Neuherberg, Germany 3 Neuropathology, Institute for Pathology, Trogerstr, Munich, Germany |  |
| **Atmospheric Pressure Non-thermal Plasma Intercation with Liquid: Bactericidal Effect and ESR Studies**, W. D. Zhu1, P. Sun2, H. Wu2, N. Bai2, H. Zhou2, R. Wang2, H. Feng2, J. Zhang2, J. Fang2 1 Saint Peter's University, Jersey City, NJ, USA 2 Peking University, Beijing, China |  |
| **Efficacy of the Plasma Pencil Against Cancerous Cells**, S. Mohades, N. Barekzi, M. Laroussi 1 Laser and Plasma Engineering Institute, Old Dominion University, Norfolk, VA, USA |  |
| **Interactions of Non-thermal Atmospheric Pressure Plasma Effluent with PC-3 Prostate Cancer Cells**, A. R. Gibson1, H. O. McCarthy2, A. Ali2, D. O'Connell1,3, W. G. Graham1 1 Center for Plasma Physics, Queen's University Belfast, Northern Ireland, UK 2 School of Pharmacy, Queen's University Belfast, Northern Ireland, UK |  |
| **Non-equilibrium Plasma Induces Several Types of DNA Damage**, V. Limonnik1, D. Dobrynin2, J. Azizkhan-Clifford1 1 Department of Biochemistry and Molecular Biology, Drexel University College of Medicine, Philadelphia, PA 2 Drexel Plasma Institute, Camden, NJ |  |
| **Towards Plasma Designing: Ozone or Nitrogen Regime**, V. Boxhammer1, T. Shimizu1, J. Koritzer1, Claire Delbridge2, J. L. Zimmermann1, G. Isbary3 1 Max-Planck Institute for Extraterrestrial Physics 2 Division of Neuropathology, Institute of Pathology, Technical University Munich 3 Departments of Dermatology, Allergology and Environmental Medicine Hospital Munich Schwabing |  |
| **Plasma Jet Interactions with Dry and Wet Tissue**, S. Norberg, W. Tian, and Mark Kushner 1 University of Michigan, Ann Arbor, MI, 48109-2122 USA |  |
| **Non-equilibrium Atmospheric Pressure Plasma Jets: Diagnostics and Application for Cancer Treatment**, A. Shashurin1, M. N. Schneider2, D. Scott1, M. Keidar1 1 The George Washington University, Department of Mechanical and Aerospace Engineering, Washington, DC, 20052 2 Princeton University, Department of Mechanical and Aerospace Engineering, Princeton, NJ 08544 |  |
| **Modeling of Plasma Effect on Tumor Area**, W. Murphy1, C. Carroll1, M. Keidar2 1 The George Washington University1Department of Electrical and computer Engineering 2 The George Washington University, Department of Mechanical and Aerospace Engineering |  |
| **Microwave Diagnostics of Atmospheric Plasmas**, D. Scott, A. Shashurin, M. Keidar 1 Mechanical and Aerospace Engineering, George Washington University, Washington DC 20052 |  |
| **The Key Mediate Role of Cell Culture Media in Killing U87 Cancer Cells Using Cold Atmospheric Plasma**, D. Yan, X. Cheng, M. Keidar 1 Department of Mechanical and Aerospace Engineering, School of Engineering and Applied Science, The George Washington University, Washington, DC 20052, USA |  |
| **Cold Atmospheric Plasma and Gold Nanoparticles Interaction in Cancer Therapy**, X. Cheng1, D. Yan1, W. Murphy1, J. Sherman2, M. Keidar1 1 Department of Mechanical and Aerospace Engineering, The George Washington University 2 Department of Neurosurgery, The George Washington University |  |
| **Atmospheric pressure Dielectric Barrier Discharge Interaction with Wet Tissue - Modeling Long(er) Term Exposure**, W. Tian1 and Mark Kushner2 1 Dept. Nuclear Engr. & Radiol. Sci. Ann Arbor, MI, 48109-2104 USA 2 Dept. Electrical Engr. & Computer Sci., Ann Arbor, MI, 48109-2122 USA |  |
| **Cold Atmospheric Plasma for Selectively Ablating Metastatic Breast Cancer Cells**, Wei Zhu1, Xiaoqian Chen1, Jerome Canady2, Michael Keidar1, Lijie Grace Zhang13 1 Department of Mechanical and Aerospace Engineering, The George Washington University, Washington, District of Columbia, United States of America 2 Jerome Canady Institute for Advanced Biological and Technical Sciences and Plasma Medicine Life Science, Takoma Park, MD, United States of America 3 Department of Medicine, The George Washington University, Washington, District of Columbia, United States of America |  |
| **Concurrent imaging and treatment of epithelial cancers using Optical Coherent Tomography and cold plasmas**, Jason Zara, Meron Ghebremedhin, Yash Jain, Olga Volotskova, Xioaquian Cheng, Alexey Shashurin, Mary Ann Stepp, Nader Sadeghi, Michael Keidar 1 The George Washington University, Washington DC |  |
| **Nonthermal Plasma Modulates Metastatic Prostate Cancer Homeostatis by Targeting Mitochondria Metabolism**, A. Zhunussova12, S. Tuleuhanov1, A. Rai2, B. Polyak2, A. Brooks3, G. Friedman4, Z.Orynbayeva2 1 Al-Farabi Kazakh National University, Almaty, Kasakhstan 2 Department of Surgery, Drexel University College of Medicine, Philadelphia, USA 3 Department of Surgery, University of Pennsylvania, Philadelphia, USA 4 Department of Electrical and Computer Engineering, Drexel University College of Medicine, Philadelphia, USA |  |
| **Comparative Analysis of Dielectric Barrier Discharge Atmospheric Cold Plasma and Atmospheric Cold Plasma Jet for Wound Healing and Cytotoxicity**, Caitlin Heslin1, Daniela Boehm1, Vladimir Milosavljevic1, PJ Cullen12, and Paula Bourke1 1 Plasma Research Group, College of Science and Health, Dublin Insitute of Technology, Dublin, 1, Ireland 2 School of Chemical Engineering, University of New South Wales, Sydney, Australia |  |