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The 1st International Workshop on Plasma for Cancer Treatment

IWPCT2014 Technical Program

**March 25, 2014**

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| **Welcome / IntroductionSession Chairs: M. Laroussi & M. Keidar** |
| 8:00 - 8:30 | Welcome Remarks by: Dean David Dolling SEAS/VPRLeo Chalupa, GWUDean Oktay Baysal, ODU |

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| **Oral Session 1: Plasma - Cell and Plasma - Tissue InteractionSession 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 Woedtke21 Center of Innovation Competence plasmatis - 17489 Greifswald, Germany2 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. Puech21 Institut Curie, CNRS UMR3348, Orsay, France2 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. Kikkawa1 Nagoya University, Nagoya, Japan |
| 10:00 - 10:20 | Morning Coffee Break |

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| **Oral Session 2: Cancer Treatment and Animal StudiesSession 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. Trink31 Department of Plasma and biomedical Engineering, Jerome Canady Institute for Advanced Biological and Technical Science, Plasma Medicine Life Science, Takoma Park, MD, USA2 Department of Mechanical and Aerospace Engineering, The George Washington University, Washington, DC, USA3 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. Pouvesle11 GREMI UMR 7344 CNRS-Universite d' Orleans, France2 CBM UPR 4301 CNRS Orleans, France |
| 11:20 - 11:50 | **Utility of Plasma Devices to Treat Cancer**, N. Barekzi and M. Laroussi1 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 InteractionsSession Chair: M. Keidar, George Washington University, Washington DC, USA** |
| 3:00 - 3:30 | **Reactive Species from Air Plasma: Implications for Therapeutic Applications**, D. B. Graves1 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. Neyts1 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. Zimmermann21 Division of Neuropathology, Institute of Pathology, Technische Universitat Munchen2 Max-Planck Institute of Extraterrestrial Physics |

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| **Oral Session 4: Destruction of Cancer Cells by Low Temperature PlasmasSession 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. Keidar11 Department of Mechanical and Aerospace Engineering, The George Washington University2 Department of Neurological Surgery, The George Washington University3 Department of Electrical and Computer Engineering, The George Washington University4 Head and Neck Cancer Research Division, John Hopkins University School of Medicine5 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'Connell11 York Plasma Institute, Department of physics, University of York, UK2 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. Fridman11 AJ Drexel Plasma Institute, Drexel University, Philadelphia, PA, USA2 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 InteractionSession 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. Uhm1 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. He21 State Key Laboratory of Advance Electromagnetic Engineering and Technology, Huazhong University of Science and Technology, Wuhan, Hubei 430030, P. R. China2 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. Hori11 Nagoya University2 NU-Eco Engineering |
| 9:30 - 10:00 | Coffee Break |

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| **Oral Session 6: Plasma Sources Used in Cancer ResearchSession 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. Weltmann21 Center for Innovation Competence (ZIK) plasmatis at the INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany2 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. Graham1 Center for Plasma Physics, Queen's University, Belfast, Northern Ireland, UK |
| 11:20 - 11:50 | **Plasma Cancer Endoscopy and Therapy**, S-O. Kim1 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 SessionModerators: 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. He11 College of Life Science and Technology, Huazhong University of Science and Technology (HUST), Wuhan, 430074, P. R. China2 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. Zimmermann21 Max-Planck Institute for Extraterrestrial Physics, Giessenbachstr, Garching Germany2 Institute of Stem Cell Research, Helmholtz Centre Munich, Neuherberg, Germany3 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. Fang21 Saint Peter's University, Jersey City, NJ, USA2 Peking University, Beijing, China |  |
| **Efficacy of the Plasma Pencil Against Cancerous Cells**, S. Mohades, N. Barekzi, M. Laroussi1 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. Graham11 Center for Plasma Physics, Queen's University Belfast, Northern Ireland, UK2 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-Clifford11 Department of Biochemistry and Molecular Biology, Drexel University College of Medicine, Philadelphia, PA2 Drexel Plasma Institute, Camden, NJ |  |
| **Towards Plasma Designing: Ozone or Nitrogen Regime**, V. Boxhammer1, T. Shimizu1, J. Koritzer1, Claire Delbridge2, J. L. Zimmermann1, G. Isbary31 Max-Planck Institute for Extraterrestrial Physics2 Division of Neuropathology, Institute of Pathology, Technical University Munich3 Departments of Dermatology, Allergology and Environmental Medicine Hospital Munich Schwabing |  |
| **Plasma Jet Interactions with Dry and Wet Tissue**, S. Norberg, W. Tian, and Mark Kushner1 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. Keidar11 The George Washington University, Department of Mechanical and Aerospace Engineering, Washington, DC, 200522 Princeton University, Department of Mechanical and Aerospace Engineering, Princeton, NJ 08544 |  |
| **Modeling of Plasma Effect on Tumor Area**, W. Murphy1, C. Carroll1, M. Keidar21 The George Washington University1Department of Electrical and computer Engineering2 The George Washington University, Department of Mechanical and Aerospace Engineering |  |
| **Microwave Diagnostics of Atmospheric Plasmas**, D. Scott, A. Shashurin, M. Keidar1 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. Keidar1 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. Keidar11 Department of Mechanical and Aerospace Engineering, The George Washington University2 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 Kushner21 Dept. Nuclear Engr. & Radiol. Sci. Ann Arbor, MI, 48109-2104 USA2 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 Zhang131 Department of Mechanical and Aerospace Engineering, The George Washington University, Washington, District of Columbia, United States of America2 Jerome Canady Institute for Advanced Biological and Technical Sciences and Plasma Medicine Life Science, Takoma Park, MD, United States of America3 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 Keidar1 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.Orynbayeva21 Al-Farabi Kazakh National University, Almaty, Kasakhstan2 Department of Surgery, Drexel University College of Medicine, Philadelphia, USA3 Department of Surgery, University of Pennsylvania, Philadelphia, USA4 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 Bourke11 Plasma Research Group, College of Science and Health, Dublin Insitute of Technology, Dublin, 1, Ireland2 School of Chemical Engineering, University of New South Wales, Sydney, Australia |  |