MEMORANDUM OF UNDERSTANDING

BETWEEN

प्लाज्मा अनुसंधान संस्थान
Institute for Plasma Research

INSTITUTE FOR PLASMA RESEARCH

Gandhinagar (Gujarat)

AND

AHMEDABAD UNIVERSITY

AHMEDABAD UNIVERSITY

Division of Biological & Life Sciences, SAS

Ahmedabad, Gujarat

FOR

Collaborative research on study of plasma sterilization, anti-bacterial and biocompatible surfaces formed using plasma treatment

NOVEMBER 2019

PREAMBLE:

On this 19th day of November in the year Two Thousand and Nineteen, a Memorandum of Understanding (hereinafter referred to as 'MOU') is entered into on the terms and conditions hereafter contained in this MOU by and between the **Institute for Plasma Research**, an autonomous Institute of Department of Atomic Energy, Government of India, having its registered office at Bhat Village, Near Indira Bridge, Gandhinagar - 382428 (hereinafter referred to as **'IPR'**) on **ONE PART**;

AND

Ahmedabad University, a non-affiliating State Private University established under Section 3(1) of the Gujarat Private Universities Act, 2009. University Grants Commission, vide its letter dated 28th July 2010 F.No. 8-13/2010(CPP-I/PU), has notified that Ahmedabad University, Navrangpura (Gujarat) has been established by an Act (No. 8 of 2009) of State Legislature of Gujarat as a State Private having its office at Ahmedabad University Commerce six roads, Navrangpura, Ahmedabad - 380009 (Gujarat) (hereinafter referred to as '**AU**') on the **OTHER PART.** Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology, The Government of India has registered Ahmedabad University as a Research Institute under its Research Programmes.

WHEREAS, hereinafter both IPR and AU will be collectively referred to as 'PARTIES' and individually referred to as 'PARTY';

WHEREAS, IPR is engaged in R&D activities in plasma science and technology for academic, strategic, societal and industrial applications such as design and development of plasma processing & demonstration equipment, process and equipment development using plasma technologies, contract research, scientific consultancy services within the domain of its expertise and applications of plasmas for various sectors such as but not limited to waste management, environment remediation, bio-medical and health, space, defense, textile etc. IPR has established itself as a key player in the field of plasma science & technology globally and in the country. In an endeavor to expand the plasma

applications for the benefit of the society and industry, IPR has been developing and optimizing plasma processes for various applications, one such being plasma processing bio-medical applications and germicidal uses.

WHEREAS, AU is an educational institute that offers students a liberal education focused on research and interdisciplinary learning as detailed in Annexure A of this MoU. Ahmedabad University has taken up the challenge of raising the standard of higher education in various fields like Management, Humanities, Engineering, Life Sciences, Information Technology, and Innovation etc. AU has been actively working in the field of bio-sciences and life sciences under the School of Arts and Sciences and has setup a full-fledged life Sciences laboratory for research and development. AU has dedicated faculties with more than 300 international peer reviewed journal publications in the field of bio-sciences and life sciences. AU collaborates with other government and non-government organizations to realize activities beneficial to academic & research areas.

WHEREAS, AU and IPR have been working together in collaboration under a MHRD funded research project along with IIT Gandhinagar and CSIR-Institute of Toxicology Kanpur since January 2018 where IPR is responsible for plasma processed isotopic nanopowder generation and AU is responsible for bio-sciences and life sciences related bio-compatibility studies;

WHEREAS, IPR has been sanctioned a research project by Department of Atomic Energy (DAE) on 'development of plasma processing technologies for societal benefits' which involves the activities related to study of plasma processing for bio-compatibility and bio-technology applications, as covered under this MoU.

WHEREAS, AU and IPR jointly discussed areas of mutual interest and observed that IPR has the expertise on plasma sciences and technology whereas AU has the expertise of bio-sciences and life sciences where the effect of plasma processing on microbes/pathogens could be investigated. The expertise of both the organizations will be useful to develop suitable plasma processes/technologies for bio-medical applications;

WHEREAS the PARTIES collectively decided to enter into a Collaboration MOU for research and development of plasma processes for killing of microorganisms and to make surfaces with anti-bacterial properties as described in subsequent clauses of this MOU;

Both the PARTIES hereby agree to this MOU as follows:

1.0 OBJECTIVE OF MOU:

The overall objective of this MOU is to collaborate and focus on research and development of plasma processes for killing of microorganisms and to generate anti-bacterial properties on surfaces.

2.0 METHODOLOGY:

IPR has the expertise of plasma processing and associated technologies. Hence it will develop plasma sources, instrumentation and apply its knowhow on plasma processing of surfaces for study of biomedical applications such as anti-bacterial properties, biocompatibility, sterilization etc. AU will test & study this plasma treated surfaces for required biomedical tests and discuss the results with IPR for further optimization. The outcome will be an optimized plasma parameter for producing biocompatible and anti-bacterial surfaces useful for various bio-medical applications.

For doing the above mentioned activity, both PARTIES will chalk out a joint research programme related to the subject of this MoU. IPR will bear the expenses towards consumables, testing and characterization charges etc. for sterilization, anti-bacterial properties, bio-compatibility and other tests at ILS, AU. AU will contribute all other resources for the activities covered under this MoU at its own expenses.

3.0 SCOPE OF WORK:

3.1 IPR will have the following scope of work:

1. To conduct literature review on plasma sterilization, plasma processing of surfaces for anti-bacterial and biocompatible properties.
2. To setup experimental plasma systems for plasma sterilization and processing of surfaces to be studied for anti-bacterial and biocompatible properties.

3. To conduct preliminary surface characterization of plasma treated surfaces and study plasma parameters at FCIPT.
4. To set up a proto-type plasma system at AU to conduct systematic study on plasma sterilization.
5. To send plasma treated samples to AU for testing and study of sterilization, anti-bacterial and biocompatible properties.

3.2 AU will have the following scope of work:

1. To conduct literature review on testing, characterization and standardization of tests related to sterilization, anti-bacterial properties and biocompatibility of surfaces.
2. To setup/arrange test facility for studying sterilization, anti-bacterial properties, biocompatibility of plasma treated and untreated surfaces.
3. To study and analyse the change in anti-bacterial properties and biocompatibility of surfaces and share the analysed & raw data with IPR for further process optimization.
4. To generate documents and test protocol as required for third party validation of the results as per international testing standards and as applicable statutorily for such applications and share the same with IPR.
5. To provide scientific and technological support to IPR in establishment and approval of the technology by statutory / regulatory / approving authorities.
6. Any other activity not listed in IPR's scope but required for the completion of the activities mentioned in this MOU.

Note: AU will return prototype plasma system to IPR on the termination of this MoU or completion of experiments under the scope of this MoU, whichever is earlier.

3.3 Deliverables:

- The deliverables shall be reports covering detailed results, optimized process parameters demonstrating effective sterilization/anti-bacterial properties/biocompatibility generated on plasma treated surfaces.
- Joint patents or publications, if possible.

4.0 GENERAL TERMS:

The areas of interest as indicated under the scope of this MOU shall be governed by separate individual projects on case to case basis as mutually entered by and between the PARTIES. The general terms of this MOU are as below:

4.1 VALIDITY:

This MOU shall be valid for a period of 3 years from the date of execution. The activities under this MOU will be initiated on the signing of this document. The MOU will stand terminated at the end of 3 years from the date of execution of this MOU. However, if mutually agreed, the tenure of this MOU may be extended to a time period mutually decided by the PARTIES in writing.

4.2 FINANCIAL COMMITMENT:

a) Both parties shall bear their own expenses.

b) IPR shall bear the costs of consumables, testing and characterization charges as incurred at actuals by AU during the course of this MoU (See Annexure B of this MoU). IPR shall bear these costs through DAE funding, subject to a maximum ceiling of Rupees Fifteen Lakhs during the tenure of this MoU.

4.3 INTELLECTUAL PROPERTY:

Intellectual property as defined hereunder includes, but is not limited to inventions and ideas, whether patentable or not, copyrightable subject matter, data bases, data compilations and collections, technical data and information, process technology, computer programs, methodologies, plans, drawings etc. Background intellectual property is the intellectual property held by either PARTY prior to this MOU. Such background intellectual property will remain with the respective PARTY only. Neither party will be permitted to utilize or disclose the background intellectual property of the other party without prior written permission. Any new intellectual property so generated from the activities under this MOU will be a joint intellectual property (IP). Such IP shall be processed through DAE – Intellectual property cell and the costs of such IP shall be shared by both PARTIES.

4.4 SECRECY & NON-DISCLOSURE:

Both the PARTIES hereby undertake to agree that the background intellectual property of other PARTY shall be held confidential and will not be revealed to any third party without prior written permission from the other PARTY. The secrecy and non-disclosure also applies to both the parties for the information and intellectual property generated out of the scope of this MoU. Any such disclosure shall be made only with prior written consent from the either PARTY. In the event of breach of the terms and conditions of this MOU, the aggrieved Party is entitled to seek statutory and equitable relief, including without limitation, injunction and preliminary injunction, in addition to any and all such other remedies and damages, including attorneys' fees and costs actually incurred.

4.5 TERMINATION

Termination of this MOU shall be applicable on either of the following grounds:

1. On completion of tenure of this MOU; OR
2. By mutual written consent and MOU between the PARTIES; OR
3. By breach of the contractual obligations under this MOU by either party; OR
4. By either party by giving 30 days prior written notice

This termination shall survive the obligations of either PARTY to keep the background intellectual property as confidential.

4.6 AMENDMENT OF THIS MOU:

This MOU can be modified or revised only by mutual MOU in writing. Any new additions to this MOU may be considered an annexure to this MOU.

4.7 CONTACT PERSONNEL:

The nodal officers acting as a technical point of contact will be:

From IPR:	From AU:
Dr. Sudhir Kumar Nema	Prof. Ashutosh Kumar
Scientific Officer-G & Head - APD	Department of Bio Sciences & Life Sciences
FCIPT, Institute for Plasma Research	SAS, Ahmedabad University

A-10/B, G.I.D.C. Sector 25 Gandhinagar-382016 (Gujarat) Email: apd@ipr.res.in	Ahmedabad 380 009 (Gujarat) Email: ashutosh.kumar@ahduni.edu.in

Point of contacts for any legal, administrative or contractual matters shall be:

From IPR: Chief Administrative Officer Institute for Plasma Research Near Indira Bridge, Bhat village Gandhinagar-382428 (Gujarat) Email: cao.ipr@ipr.res.in	From AU: Registrar Ahmedabad University Ahmedabad (Gujarat)

4.8 DISPUTE RESOLUTION

Any dispute or difference arising out of this MOU shall be resolved in the following manner:

4.8.1 Amicable Resolution:

Save where expressly stated to the contrary in this MOU, any dispute, difference or controversy of whatever nature howsoever arising under, out of or in relation to this MOU between the PARTIES and so notified in writing by either Party to the other party in the first instance shall be attempted to be resolved amicably. In the event of dispute between the PARTIES, either party may require such dispute to be referred to the Joint Conciliation consisting of Director – IPR and Registrar – AU and the two parties shall meet within a period of seven (7) date of such request to discuss and attempt to resolve the dispute amicably. The settlement MOU, if any, decided pursuant to the conciliation proceedings shall have the same effect and status of an arbitral award.

4.8.2 Arbitration:

Any dispute, which is not resolved amicably under Clause 4.8.1 within a period of sixty (60) days from the date on which one party notified the other party of the dispute, shall be finally decided by reference to arbitration of a Sole Arbitrator, who shall be mutually decided between the parties. The procedure mandated under the Arbitration &

Conciliation Act, 1996 and its enactments thereof shall be followed in case of failure to appoint a mutually decided Sole Arbitrator. The arbitral proceedings will be carried out in accordance with the Arbitration & Conciliation (Amendment) Act, 2019 & its re-enactment, amendment thereof as the case may be. The venue of such arbitration shall be Gandhinagar, Gujarat and the language of the arbitration shall be English.

4.9 **JURISDICTION**

This MOU shall be governed and interpreted in accordance with the laws of India. The Courts at Gandhinagar shall have the exclusive jurisdiction to try the dispute arising under this MOU.

IN WITNESS WHEREOF, the parties have caused this MOU to be executed in the English languages in duplicate by the proper officials as of the date hereof.

For and on behalf of IPR

Feb 3, 2020

Chairman – Sr. Purchase Committee

Institute for Plasma Research

Date: Feb 3, 2020

Place: Gandhinagar

Seal

S K Nema

Witness:

Dr. S. K. Nema
Head, APD
SO-H

For and on behalf of AU

Registrar

Ahmedabad University

Date:

Place: Ahmedabad

Seal

Witness:

Ritesh Kumar Shukla, PhD
Assistant Professor
Division of Biological & Life Sciences
School of Arts & Sciences
Ahmedabad University
Central Campus, Navrangpura,
380009

Annexure-A

Profile of Ahmedabad University

Ahmedabad University (AU) was established in July 2009. It is promoted by Ahmedabad Education Society (AES), a Society established in 1935 which is one of the best education societies in western India. It is a self-financed, non-affiliating State Private University established under Section 3(1) of the Gujarat Private Universities Act, 2009. University Grants Commission, vide its letter dated 28th July 2010 F.No. 8-13/2010(CPP-I/PU), has notified that Ahmedabad University, Navrangpura (Gujarat) has been established by an Act (No. 8 of 2009) of State Legislature of Gujarat as a State Private University and is empowered to award degree as specified by the UGC under section 22 of the UGC Act 1956. Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology, The Government of India has registered Ahmedabad University as a Research Institute under its Research Programmes. Ahmedabad University has taken up the challenge of raising the standard of higher education in various fields like Management, Humanities, Engineering, Life Sciences, Information Technology, and Innovation etc. to global benchmarks.

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Annexure-B
Characterization charges at Ahmedabad University

Sr No.	Facility	Charges
1	Flow cytometer	For Acquiring Samples: 3000/- per Hour (Unassisted) For Acquiring Samples: 4000/- per Hour (Assisted) NOTE: Extra charges are applicable for using Lab Equipment and Chemicals.
2	Florescent Microscope	2000/- per hour
3	Dynamic Light Scattering	400/- per sample for Sample size or Zeta potential 600/- per sample for both sample size and zeta potential NOTE: Extra charges are applicable for zeta cuvettes (500/- per cuvette)
4	Fourier transform infrared spectroscopy (FTIR)	400/- per sample
5	ELISA Multiplate Reader	300/- sample/plate Extra Charges for Fluorescent Plate / Black Bottom Plate Usage : Rs. 500/-
6	ThermoCycler	PCR: 500/- per complete cycle. Gradient PCR: 800/- per complete cycle