Prof. RAKESH KUMAR (Retd)
Dean Faculty of Science (Retd)
Professor & Head Department of Physics (Retd)
Chaudhary Charan Singh University
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Prof. RAKESH KUMAR (15-01-1958)

EDUCATION

1997- **Ph.D (Physics)- Panjab University Chandigarh**:

Thesis: "*Fabrication of Optically Transparent SiN X-ray Mask Membrane with Low Stress and High Radiation Durability by High Temperature LPCVD Deposition"*

(Thesis Advisor: Prof. K.N.Pathak, **Former Vice Chancellor of Panjab University, Chandigarh**

Dr. R.P.Bajpai, Former Chancellor, Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, Avadi, Chennai, **Former Vice Chancellor of Guru Jambheshwar University of Science & Technology, Hissar, and Former Vice Chancellor of Kurukshetra University, Kurukshetra**).

1981- **M.Sc (Physics)- Panjab University Chandigarh**
1978- **B.Sc** (Physics)- **Panjab University Chandigarh**

Academic Specialization: **Nanotechnology, Material Science, Semiconductor Device Fabrication, Thin Films, Nano Characterization, Instrumentation**

Thrust Areas of Research: Surface Plasmon for Photovoltaic and Bio-Sensing Application, **Photonics**, Magneto-Plasmonic Nanostructures for Senor Applications, Nanofabrication and Nanocharacterization

Professional Experience: **37 Years of Experience of Post-Graduate Teaching and Research and administration in university and Industrial Research experience at India and Abroad.**

Scholarship/Fellowship

1987-88 Association for Overseas Technical Scholarship (AOTS), Japan for *Advanced Research in Synchrotron Radiation Lithography for 0.25 μm ULSI Semiconductor Device Fabrication at Research Laboratories of NEC Corporation, Japan*

ACADEMIC APPOINTMENTS

August 2004-June 2020	**Professor of Physics, Chaudhary Charan Singh University, Meerut, India**
January 2002-July 2004	**Visiting Professor- *Laboratorio Tecnologie Avanzate Superfici e Catalisi –INFM (CNR), Trieste, Italy.***
August 1999-July 2000	**Visiting Fellow- NANYANG TECHNOLOGICAL UNIVERSITY, SINGAPORE**
June 1995-August 1995	**Exchange Visitor- WISCONSIN UNIVERSITY, MADISON, USA**

Industrial Position Elsewhere:

Dec 1982-Aug 2001	**Research Scientist**	**CSIR, India**

Visiting Positions Abroad:

Jan 2002-July 2004	**Visiting Professor**	***Laboratorio Tecnologie Avanzate Superfici e Catalisi –INFM (CNR), Trieste, Italy***
Aug 1999-July2000	**Visiting Fellow**	**Nanyang Technological University, Singapore**
June 1995-Aug 1995	**Exchange Visitor**	**Wisconsin University Madison, USA**
Nov 1990-Jul 1991	**Visiting Professor**	**Institute of Solid State Electronics-CNR, Rome, Italy**
Oct 1991-May 1994	**Visiting Scientist**	**OKI Electric Japan**
Aug 1988-Aug 1990	**Visiting Scientist**	**NEC Corporation Japan**
Aug 1987-July 1988	**AOTS Scholarship (Govt of Japan)**	**NEC Corporation Japan**

Administrative Position (Chaudhary Charan Singh University Meerut, India)

Worked closely with the Vice Chancellor to put the vision of the university into action to discharge following **administrative responsibilities** in **following administrative positions**:

2007-2008	**Member of Executive Council :**
2009-2010	*Have been involved in **administration** as **Member of Executive Council** of*
2011-2014	*the university for accreditation and affiliation of colleges with university*
2016-2017	*and external bodies*.

Aug 2004-Jan 2020 **Member of Academic Council**

Sept 2019-Jan 2020: Dean, Faculty of Science

- As a **Dean, Faculty of Science**, discharged the **administrative responsibility** of curriculum development, in consultation of Academic Heads of teaching Departments of Faculty to ensure that the University's academic programs are in line with requirement of industry.
- In the capacity of **Dean, Faculty of Science**, discharged the **administrative responsibility** of **Chairman Board of Study of Faculty**.
- In the capacity of **Dean, Faculty of Science**, discharged the **administrative responsibility** of **Research Degree Committee** of **Faculty of Science**.

Sept 2019-Jan 2020: As a **Dean, Faculty of Science**, discharged the **administrative responsibility** of **(In compliance of University Statute).**

- **Head, Department of Chemistry**
- **Head, Department of Toxicology**

Sept 2018-Jan 2020:	**Head, Department of Physics**
Sept 2018-Jan 2020:	**Convener & Member, Board of Studies in Physics**
Oct 2010-July 2014	**Dean, Faculty of Engineering & Technology**
July 2011-July 2014	**Head of Department of Physics**
July 2011-July 2014	**Convener & Member, Board of Studies in subject of Physics**
July 2014-Jan 2020	**Director, Training & Placement**
July 2007-Nov 2011	**Director, SC/ST Cell**
April 2005-Jan 2006	**Chief Proctor-** Provide leadership to the nurture discipline and culture in the campus in the capacity of **Chief Proctor of University.**

Career Highlight/Achievements

Teaching

MoUs formulated for academic and research collaborations:

Memorandum of Understanding (MoU) for Cooperation Agreement on Scientific and Technological Cooperation **Marco Polo Cooperation Program** between **Università degli Studi di Catanzaro Magna Græcia (UMG), Italy** and **Department of Physics of CCS University Meerut India** on **26th February 2009 at Meerut, India**.

Research Collaboration with National Institution/Agencies

Name of Institution	Nature of Association	Contribution done
Inter University Accelerator Center, New Delhi	**Research Collaboration**	**Development of low energy metallic ion beams using Electron Cyclotron Resonance Ion Source (ECRIS)** for various application in nanotechnology and material science.

Curricula Development

Academic Programs formulated	Approval of Academic Council	Academic Session
M.Phil in Microelectronics	**03/2013**	**2014-15**
Pre Ph.D Course in Physics	**03/ 2017**	**2017-18**

- Extensive postgraduate teaching: Physics (Electronics, Solid State Physics, Semiconductor Device Fabrication), Thin Film, Micro and Nanofabrication, Nanostructure Characterization.
- Postgraduate course development for applied and interdisciplinary postgraduate course in physics for M.Sc, M.Phil in Microelectronics and Pre-Ph.D course.

- **Post Graduate supervision completed**

Level	Students guided	Degree Awarded
M.Phil	**16**	**16**
Ph.D	**1**	**1**

BAR CODE EVALUTION SYSTEM: Developed **bar-code based evaluation of examination answer sheets of university in 2015, which is used for evaluation of examination answer sheet of students of University and its Affiliated Colleges of various course (presently this is out sourced from external agency).**

Research

Publications

Published Research Papers **52 In Peer Reviewed journals.**

Books authored **Mathematical Physics**, **Kedarnath Ramnath Publisher, New Delhi (2006) ISBN:978-93-80803**-

Books edited/chapter: ***Micro & Nnano fabrication and their Medical Application,* pp97, (Chapter-4)** in ***Bio-MEMS & Biomedical Nanotechnology, Vol.1, Edited by A.P Lee, J. Lee and M. Ferrari, Published by Springer-Verlog (***2006): ISBN 978-0-387-25842-3

Patents (International) Granted

1) **US Patent: 7,588,882 B2 (15-9-09)**
   Method for Fabricating Complex 3-Dimensional Structures on sub-micrometric Scale by Combined Lithography of Two Resist, Inventor: F.Romanato, R.Kumar, E.Di Fabrizio
2) **European Patent No: EP 1519227 A8 (12-03-2008)**
   Procedure for Fabrication of Complex Three Dimensional Structures on Sub-Micron Scale by Means of Two Layers Photoresist Lithographic Process
   Inventor: Filippo Romanato, Trieste (IT), Enzo Di Fabrizio, Trieste (IT);
   Rakesh Kumar, Chandigarh (IN)

Editorial Board Member of International Journal & Reviewer

. Former, Member of Editorial Board: International Journal of Nanolithography
. Former Member of Editorial Board: International Journal of Applied Nanotechnology
. Former International Journal of Micro Machining (JMM)-(Institute of Physics)
. Former Optical Fiber Technology (Elsevier)

Research projects/Grant Mobilized for Facilities creation during last 10-Years

Funding Agencies	**Project**	Amount of Grant **(₹ Lacs)**
DST Govt of India	**FIST-Level-I**	190.00
UGC, New Delhi	Atomic Force Microscope (AFM)	52.00
UGC, New Delhi	Optical Stepper with Nanoimprint Lithography	102.00
University	Class-1000 and Class 10000 Cleanroom facility	40.00
UGC, New Delhi	Scanning Tunneling Microscope (STM)	7.00
UGC, New Delhi	Virtual Laboratory (Lab View and Elvis)	14.00
DST Govt of India	Micro & Nano manipulation Device For Cell and Sub-Cellular Study: Study, realization and experiment on Nano & micro systems for in-situ controlled drug delivery	5.0

Total Grants: 410 Lacs

Consultancy/Completed Research Project (Member of Research/Project Team)

Organization	Project Description
Inter University Accelerator Center, New Delhi	Development of low energy metallic ion beams using Electron Cyclotron Resonance Ion Source (ECRIS) for various application in nanotechnology and material science.
Ministero dell Istruzione dell Universitae della Ricerca (MIUR), Italy	Gold circular and square pinhole arrays for the European Synchrotron Radiation Facility (ESRF) Troika beam line
Amplipone spa Italy	3D digital scanner based on micro-machined micro-mirror for the metrological measurement of the human ear canal.
Ministero dell Istruzione dell Universitae della Ricerca (MIUR), Italy	Development of Focused Ion beam (FIB) Lithography technique for fabrication of 2-D array structures for photonic application: Development of 1-D & 2-D Photonic Crystal fabrication technology
Ministero dell Istruzione dell Universitae della Ricerca (MIUR), Italy	Develop a Multiple-tilt Interface hybrid lithography process as a viable technology to realize 3-D micro and nanostructures embedded with arbitrary shaped and sized patterns:
Ministero dell Istruzione dell Universitae della Ricerca (MIUR), Italy	Development of Efficient Fibre-to-waveguide coupling device by designing & fabrication of diffractive optical Elements (DOEs)-Micro lens with continuous relief on-top of optical fibre for fibre-to-waveguide coupling
Ministero dell Istruzione dell Universitae della Ricerca (MIUR), Italy	Lithographic nano patterning of SnO_2 for enhancing gas sensitivity of sensor
Ministero dell Istruzione dell Universitae della Ricerca (MIUR), Italy	Wavefront Engineering for Diffractive Optics for Optical Trapping:-Development of Optical Tweezers for micro-particles manipulation

Ministero dell Istruzione dell Universitae della Ricerca (MIUR), Italy	Micro & Nano Fabrication by X-ray Lithography for biomedical and other Inter disciplinary applications
OKI Electric Industry Japan-SORTEC Consortium Japan	LPCVD Deposition Process at High Temperature in vertical chamber for deposition of SiN thin film having High Optical Transparency and High Radiation Durability
CNR-Italy	Fabrication of 1.55 µm gratings for Distributed Feed-back Lasers (DFB) using synchrotron radiation proximity lithography
NEC Japan-British Petroleum Research USA	Microwave Deposition of Diamond Thin Film and Characterization their application for X-ray mask membrane application
CSIR Research Laboratory, India	Worked as member of project-team on project:- • "Development of *Combine Electron Spectroscopy for Chemical Analysis (ESCA), Auger Electron Spectroscopy (AES) and Ion Scattering System (ISS) System,* and • *X-ray Lithography System Development.* Worked as co-investigator on *Design of Electrostatic Lens for Ion Gun* and *Electron gun* and Digital Ion Gauge equipment for measurement of Ultra High Vacuum.

Research Publications in Referred Journals: (930-Reads; Total Citation: 318)

Year	Title	Name of Jurnal	Citation
2009	***Nano- A new frontier in present century;***Bhattacharyya,A.Bhaumik, M.Nandi, S.Viraktamath, **R.Kumar**, et.al	***Advances in Life Science, 3(1-4), 2009, pp18-23***	8
2008	**Charge-state distributions of metallic electron cyclotron resonance plasmas,** *P.Kumar, **R.Kumar**, G. Rodrigues, P. S. Lakshmy, and D. Kanjilal,*	**J. Vac. Sci. Technol. A 26, 97 (2008);**	16
2008	***Local structure, optical and magnetic studies of Ni nano structures embedded in a SiO_2 matrix by ion implantation;*** S.K.Sharma, P.Kumar, Ravi Kumar, M.Knobel, P.Thakur,K.H.Choi, **R.Kumar**, et.al	**J.Phys. Condens Matter 20 (2008),285211;**	18
2006	**Development of Zn and Eu beams by plasma sputtering**; P.Kumar, G.Rodrigues, D.Kanjilal, A.Roy, B.P.Singh, **R.Kumar**;	**Nucl. Instrum. and Meth. B, 246 (2006) 440**	15
2006	**Development of metallic ion beams using ECRIS**; P.Kumar, G.Rodrigues, P.S.Lakshmy, D.Kanjilal, B.P.Singh, **R.Kumar**	**Nucl. Instrum. and Meth. B, 252 (2006) 354**	**37**
2005	SnO2 lithographic processing for nano-patterned gas sensors	Journal of Vacuum Science & Technology B**23**, 2784 (2005)	**23**

2005	**Three-dimensional digital scanner based on micro machined micro mirror for the metrological measurement of the human ear canal;** M.Prasciolu, R.Malureanu, S.Cabrini, D.Cojoc, L.Businaro, A.Carpentiero, **R.Kumar,** E.Di Fabrizio;	**J.Vac.Sci. Technol. B 23 (2005), 2990**	**23**
2005	***Low Cost Transparent SU-8 Membrane Mask for Deep X-ray lithography*, S.Cabrini, F.Perennes, B.Marmiroli, A.Olivo, A. Carpentiero, **R.Kumar,** et.al,	**MicrosystemTechnologies Vol.11 (2005), 372**	8
2005	***Focused Ion Beam Lithography for Two Dimensional Array Structures for Photonic Applications;*** S.Cabrini, A. Carpentiero, **R.Kumar,** et.al,	**Microelectronic Engineering *Vol.* 78–79 (2005)**, 11	**67**
2005	***SnO_2 Lithographic Processing for Nano-patterned Gas Sensors, SnO_2 Lithographic Processing for Nano-patterned Gas Sensors,*** P.Candelro, E.Comini, C.Baratto, G.Faglia, S.Sberveglieri, **R.Kumar,** et.al	**J.Vac.Sci.& Technol. B23(6) (2005),2784**	**23**
2004	***Fabrication through silicon micro machining of 3D scanner for optical determination of the ear canal***; M.Prasciolu, S.Cabrini, D.Cojoc,R.Malureanu, **R.Kumar, *et.al***	**Medi. & Bio. Eng. Vol 6 (2004) (Print ISSN:1727-1983)**	6
2004	***Interface lithography: A hybrid litho-graphic approach for the fabrication of Patterns embedded in 3-D structures*:** F. Romanato, **R.Kumar,** et.al	**Nanotechnology Vol.16(1) (2004), 40,**	**10**
2004	**X-ray lithography for micro- and nano-fabrication at ELETTRA for inter-disciplinary applications (Invited),** E.Di Fabrizio, R.Fillipo,F.Perenneas, S.Cabrini, **R.Kumar,** et.al	**J.Phys. Condensed Matter Vol. 16 (2004),S3517**	**34**
2004	***Design and Implementation of Optical Tweezer Arrays using Diffractive Optical Elements,*** D.Cojoc, E.Ferrari, S.Cabrini, R.Malureanu, Miltcho B.Danailov, A.Carpentiro, M.Prasciolu, **R.Kumar, et.al**	**SPIE Vol.5477 (2004),281**	7
2004	***Design and Fabrication of Diffractive Optical Element-Microlens with Continuous Relief Fabricated On-Top of Optical Fibre by Focused Ion Beam for Fibre-to-Waveguide Coupling***, F.Shiappelli, **R.Kumar,**et.al	**Jap. J. Appl. Physics Vol.43 (2004), 3772**	**10**
2004	***Electromagnetically actuated surface micro-machined free standing torsion beam micro-mirror made by electroplated nickel***, M.Prasciolu, A.Carpentiro, **R.Kumar, et.al**	**Jap. J. Appl. Physics, ol.43 (2004), 418;**	6

2004	***Efficient fiber-to-waveguide coupling by a lens on the end of the optical fiber fabricated by focused ion beam milling,*** F.Shiappelli, **R.Kumar,** et.al,	**Microelectronic Engineering, Vol. 73–74 (2004), 39;**	**85**
2003	***X-ray lithography patterning of magnetic materials and their characterization,*** P.Candelor, **R.Kumar,** et.al	**Jap. J. Applied Physics, Vol. 42 (2003), 3802.**	4
2003	***Design and fabrication of on-fiber diffractive elements for fiber-waveguide coupling by means of e-beam lithography,*** M.Prasciolu, D.Cojoc, S.Cabrini, L.Businaro, P.Candeloro, M.Tormen, **R.Kumar,** et.al	**Microelectronic Engineering, Vol. 67–68, (2003) 169;**	**30**
2003	***Fabrication of diffractive optical elements on-fiber for photonic applications by Nanolithography***, M.Prasciolu, P.Candeloro, **R.Kumar,** et.al	**Jap. J. Applied Physics. Vol. 42 (2003),** 4177	**12**
1994	**Fabrication of reliable x-ray mask using high-temperature deposited SiN membrane by low-pressure chemical vapour deposition system**,T.Ohta, **R.Kumar,** et.al	**SPIE 2254(1994) 304,**	7
1994	**High temperature deposition of SiN films using low pressure chemical vapor deposition system for x-ray mask application**,T.Ohta, **R.Kumar,** Y.Yamashita, H.Hoga,	**J.Vac.Sci. Technol. B12 (1994),585**	**12**
1993	**Improvement in Radiation Stability of SiN X-Ray Mask Membranes,** T.Arakawa, H.Okuyama, Y.Tamashita, T. Ohta, **R.Kumar,** S.Noda, H.Hoga,	**Jpn. J. Appl. Phys. 32 (1993), 5941**	**11**
1992	**CD control of sub-200 nm x-ray masks using an e-beam writer,** E.Di Fabrizio, L.Luciani, M.Baciocchi, L.Mastergiacomo,**R.Kumar,** et.al	**Microelectronic Engineering, Vol. 17 (1992) 171**	2
1992	**Fabrication of DFB laser gratings using synchrotron radiation proximity Lithography.** M.Gentili, L.Grella, M.Baciocchi, **R.Kumar,** et.al	**Microelectronic Engineering, Vol. 17 (1992) 551.**	2
1992	**Optically High Transparent SiN Mask Membrane with Low Stress Deposited by Low Pressure Chemical Vapor Deposition, R.Kumar,** et.al	**Jpn. J. Appl. Phys. 31 (1992), 4195.**	**13**
1991	***0.1µm X-ray mask replication***, M.Gentili, **R.Kumar,** et.al	**J. Vac. Sci. Technol. B9 (1991), 3319.**	**12**
1991	**Thermal stability improvement in novolak based resist by synchrotron radiation hardening process**, R.Kumar, K.Fuji;	**J. Vac. Sci. Technol. B 9 (1991) 2523;**	1
1991	***X-ray irradiation effects on a microwave - plasma chemical vapor deposition diamond membrane, K. Suzuki, R.Kumar, et.al***	**J. Vac. Sci. Technol. B 9, 3266 (1991);**	**20**

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Conference (International)

Year	Title of Conference	Title Subject of Presentation
16-18 March 2006	2nd International Conference on Nanoscience & Technology (INCOSAT-2006),	Interface lithography: Hybrid approach for fabrication of wave guide pattern embedded in 3-D photonic crystal structure: Kaushal Rani, R.Kumar, Beer Pal Sing
Nov 8-10, **1995**	National Symposium on Plasma Physics, IIT Kanpur (India), Nov 8-10 **(1995),** pp 73	**SiN Film Deposition by High Temperature LPCVD**: **R.Kumar**
	7th International Workshop on Physics of Semiconductor Device-1991(*IWPSD-91),* **2-5 Dec 1991 New Delhi India**	Selective Tungsten Deposition using Resist Stencil Mask, **R. Kumar**, pp 161
31st May-3rd June 2005	49th International Electron, Photon & Ion Beam Conference , 2005 (EPIBN-2005), Orlando, USA	**3-D Digital Scanner based on micro machined micro-mirror for the metrological measurement of the human ear canal based on MOMS scanning micro mirror:** M.Prasciolu, R.Malureanu, S.Cabrini, D.Cojac, **R.Kumar**, E.DiFabrizio
31st May-3rd June 2005	49th International Electron, Photon & Ion Beam (EPIBN-2005) Conference , 2005, **,Orlando, USA**	**SnO_2 lithographic processing for nano-patterned gas sensor**::P.Candeloro, E.Comini, C.Baratto, G.Faglia, G.Sberveglieri, **R. Kumar**, **A. Carpentiero** and **E. Di Fabrizio**
19-22 Sept 2004	Proceedings of the 30th International Conference on Micro- and Nano-Engineering,2004, **Rotterdam (Holland)**	Focused ion beam lithography for two dimensional array structures for photonic applications; **S. Cabrini** , A. Carpentiero, R. Kumar, et.al
19-22 Sept 2004,	30th International Micro and Nano Engineering (MNE-04) Conference 2004 **Rotterdam (Holland)**	**3-D Digital Scanner based on micro machined micro-mirror for the metrological measurement of the human ear canal based on scanning micromirror:**M.Prasciolu,R.Malureanu, S.Cabrini, D.Cojac, **R.Kumar**, E.DiFabrizio
31st July-5th August 2004,	10th Mediterranean Conference on Medical and Biological Engineering (MEDICON), 2004 **Ischia, Italy**	**Fabrication through silicon micromachining of 3-D scanner for optical determination of ear canal:** M.Prasciolu, S.Cabrini,D.Cojoc, R.Malureanu, **R.Kumar,** et.al

June 2004	6th SPIE International Conference on Correlation Optics, **SPIE, Bellingham, WA, 2004**	Design and implementation of optical tweezer arrays using diffractive optical elements: **Dan Cojoc ; Enrico Ferrari ; Stefano Cabrini ; Radu Malureanu ; Miltcho B. Danailov ; Alessandro Carpentiero ; Mauro Prasciolu ; Rakesh Kumar** ; et.al
22–25 Sept 2003	**Proceedings of the 29th international conference on Micro and Nano Engineering 2003, Cambridge, UK 2003**	Efficient fibre-to-waveguide coupling by a lens on the end of the optical fibre fabricated by focused ion beam milling: F.Schiappelli, **R.Kumar** , et.al
28-31 Octobe r 2003	Digest of Papers of International Conference on Micro processes & Nanotechnology 2003,**Tokyo, Japan**	**Design & Fabrication of DoE-microlense with continuous relief fabrication on-top of optical fibre by Focused Ion Beam for Fibre to Waveguide coupling:** F. Schiappelli, **R.Kumar**, et.al
6-8 Nov 2002	Digest of Papers of International Conference on Micro processes & Nanotechnology 2002, **6-8 Nov. 2002, Tokyo, Japan**	**Fabrication of diffractive optical elements for photonic applications by nanolithography:** E.Di Fabrizio, M.Prasciolu, **R.Kumar**, et.al
6-8 Nov. 2002	International Conference on Micro processes & Nanotechnology 2002, **Tokyo, Japan**	**X-ray lithography patterning of magnetic material and their characterization:** E.Di Fabrizio, P.Candeloro,**R.Kumar,** et.al
Sept. 16-19, 2002	Proceedings of the 28th International Conference on Micro- and Nano-Engineering,2002, , **Lugano, Switzerland**	Design and fabrication of on-fiber diffractive elements for fiber-wave guide coupling by means of e-beam lithography: M.Prasciolu, D.Cojoc, S.Cabrini, L.Busin aro, P.Candeloro, M. Tormen, **R.Kumar**, et.al
22-24 April 1994	SPIE International Symposium on Photomask and X-Ray Mask Technology 1994, **Kawasaki, Japan**.	**Fabrication of reliable x-ray mask using high-temperature deposited SiN membrane by low-pressure chemical vapour deposition system:** T.Ohta, **R.Kumar**, et.al
March 1993	**54th Meeting of Japan Society of Applied Physics Meeting, 29-a-L-7 (1993).**	**Optical Properties of LPCVD Deposited SiN Membrane:** T.Ohta, **R.Kumar,** et.al
13-16 July, 1992	5th International MicroProcess Conference, 1992, Kawasaki, Japan	Improvement in Radiation Stability of SiN X-Ray Mask Membranes: **T.Arakawa, H.Okuyama, Y.Yamashita, T.Ohta,** R.Kumar**, S. Noda & H.Hoga**
July 13-16, 1992	5th International Micro Process Conference (1992), , Kawasaki, Japan	**Optically High Transparent SiN Mask Membrane with Low Stress Deposited by Low Pressure Chemical Vapor Deposition: R. Kumar**, et.al

March 1993	54th Meeting of Japanese Society of Applied Physics Meeting, 29-a-L-10 **(1993).**	**Improvement in Synchrotron radiation (SR) durability of X-ray mask Membrane**: T.Ohta, **R.Kumar**, et.al
August 1992	**Japan Society of Applied Physics 53rd Autumn Meeting 1992.**	LPCVD Deposited X-Ray mask Membrane: T.Ohta, **R.Kumar**, et,al
29-31st May', 1991	35th International Electron, Photon & Ion Beam (EPIBN) Conference , 1991 (Annual International conference); **Seattle, USA**	**X-ray Irradiation effects in Microwave Plasma CVD deposited diamond membrane:** K.Suzuki, **R.Kumar**, et.al
Sept 1991	Proceedings of the International Conference Micro Engineering 91,, Rome, Italy	**CD control of sub-200 nm X-ray masks using an E-beam writer:**E.Di Fabrizio, L.Luciani, M.Baciocchi, L.Mastrogiacomo, **R.Kumar**, L.Scopa
Sept 1991	Proceedings of the International Conference Micro Engineering 91, **Rome, Italy**	**Fabrication of DFB laser gratings using synchrotron radiation proximity lithography:** M.Gentili, L.Grella, M.Baciocchi, **R.Kumar**, et.al
29-31st May' 1991	35th International Electron, Photon & Ion Beam (EPIBN) Conference , 1991 (Annual International conference) **Seattle, USA**	**0.1m X-ray Mask Replication:** M.Gentili, **R.Kumar**, et.al
March-1988	**Japan Society of Applied Physics 49th Spring Meeting, 1988.Japan**	**Atmospheric exposure effects on resist sensitivity: R.Kumar,** K.Fujii, K.Okada:
March-1988	Japan Society of Applied Physics 49th Spring Meeting, 1988.Japan	**Characterization of TSNE Resist-A Silicon Containing Resist for X-ray Lithography: R.Kumar;** et.al