

Institute of Physics Publishing

# International Symposium on Vacuum Science and Technology

IVS 2007

Journal of Physics: Conference Series Vol. 114

November 29-30, 2007  
Colaba, Mumbai

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

ISBN: 978-1-60560-231-8

Some format issues inherent in the e-media version may also appear in this print version.

Copyright (2007) by the Institute of Physics Publishing.

All rights reserved.

For permission requests, please contact the Institute of Physics Publishing at the address below.

Institute of Physics Publishing  
Dirac House, Temple Back  
Bristol BS1 6BE UK

**Tel** +44 (0)117 929 7481  
**Fax** +44 (0)117 929 4318

Institute of Physics Publishing  
International Symposium on Vacuum  
Science and Technology  
2007

## TABLE OF CONTENTS

<b>Large High-vacuum Systems for CERN Accelerators</b> .....	1
<i>P Strubin</i>	
<b>Superconducting Cyclotron and Its Vacuum System</b> .....	11
<i>A Sur, R K Bhandari</i>	
<b>Accelerator Vacuum Systems at DESY</b> .....	21
<i>K Zapfe</i>	
<b>Multispectral Antireflection Coating Simultaneously Effective in Visible, Diode Laser, Nd-YAG and Eye Safe Laser Wavelength</b> .....	31
<i>P K Bandyopadhyay</i>	
<b>Vacuum System for Superconducting LINAC at TIFR</b> .....	37
<i>R G Pillay</i>	
<b>Niobium Coating Techniques</b> .....	38
<i>S Calatroni</i>	
<b>Road Map for Studies to Produce Consistent and High Performance SRF Accelerator Structures</b> .....	48
<i>G R Myneni, J F O'Hanlon</i>	
<b>Some Developments on Ceramic-to-metal and Glass-ceramics-to-metal Seals and Related Studies</b> .....	49
<i>G P Kothiyal, M Goswami, V K Shrikhande</i>	
<b>Latest Developments in Ion Pump Technology: the NEG Ion Pump</b> .....	58
<i>C Paolini, M Mura, M Audi</i>	
<b>Evolution of Gettering Technologies for Vacuum Tubes to Getters for MEMS</b> .....	59
<i>M Amioti</i>	
<b>A Road Map to Extreme High Vacuum</b> .....	60
<i>P Adderley, G Myneni</i>	
<b>Dry Vacuum Pumps</b> .....	76
<i>R Sibuet</i>	
<b>The ITER Vacuum Systems</b> .....	77
<i>C Day, D Murdoch</i>	
<b>Vacuum System Design for NSLS-II Storage Ring</b> .....	89
<i>H C Hseuh, C L Foerster, J P Hu, S Sharma, J R Skaritka</i>	
<b>THz Vacuum Microelectronic Devices</b> .....	90
<i>V Srivastava</i>	
<b>Material Processing with Vacuum</b> .....	100
<i>N Krishnamurthy, A K Suri</i>	

<b>Gigawatt Power Microwave Devices and Vacuum</b> .....	101
<i>J Larour</i>	
<b>An Analytical Model to Describe the Compression in Turbomolecular Pumps and Roots Blowers</b> .....	102
<i>G Voss</i>	
<b>Development of UHV Compatible Machined Diamond Profile Gaskets for INDUS-2</b> .....	114
<i>D P Yadav, R Shiroman, S K Shukla, S Kotaiah</i>	
<b>Advantages and Safety Features Using Foundation Fieldbus-H1 Based Instrumentation &amp; Control for Cryo System in Accelerators</b> .....	121
<i>S Kaushik, K K M Haneef, M N Jayaram, D K Lalsare</i>	
<b>Multi Target Assembly for Proton Beam Irradiation Setup at 14UD BARC-TIFR Pelletron Accelerator Facility</b> .....	125
<i>S C Sharma, Ramjilal, N G Ninawe, S B Salvi, A K Gupta, P V Bhagwat, R K Choudhury, S Kailas</i>	
<b>Distributed UHV System for the Folded Tandem Ion Accelerator Facility at BARC</b> .....	128
<i>S K Gupta, A Agarwal, S K Singh, A Basu, Sapna P, S P Sarode, V P Singh, N B V Subrahmanyam, J P Bhatt, S S Pol, P J Raut, S V Ware, P Singh, R K Choudhury, S Kailas</i>	
<b>Estimation of Partial Pressure During Graphite Conditioning by Matrix Method</b> .....	135
<i>P Chaudhuri, A Prakash, D C Reddy</i>	
<b>Vacuum System of the 3MeV Industrial Electron Beam Accelerator</b> .....	142
<i>D Jayaprakash, R L Mishra, S R Ghodke, M kumar, M kumar, K Nanu, Dr K C Mittal</i>	
<b>Vacuum System Requirement for a 5 km Baseline of Gravitational-wave Detector</b> .....	147
<i>S Sunil, D G Blair</i>	
<b>The UHV System of the 10 MeV RF Electron Linac</b> .....	153
<i>D Bhattacharjee, D Jayaprakash, R L Mishra, V T Nimje, K C Mittal</i>	
<b>Study of Initial Dynamic Pressure Rise Behaviour in Indus-2</b> .....	157
<i>T Bansod, S K Shukla, K V A N P S Kumar, S Kotaiah</i>	
<b>Simulation Studies of Vacuum System for Indus-2</b> .....	163
<i>S K Shukla, S Kotaiah</i>	
<b>Investigation of an Expanding Copper Plasma Across a Transverse Magnetic Field Generated by Strip-type Electron-beam</b> .....	171
<i>A Majumder, G K Sahu, R A Patankar, K B Thakur, V K Mago</i>	
<b>Use of Langmuir Probe for Analysis of Charged Particles in Metal Vapour Generated by Electron Beam Heating</b> .....	177
<i>B Dikshit, M S Bhatia</i>	
<b>450 kW Plasma Melting System</b> .....	182
<i>M N Jha, S N Sahashrabuddhe, P S S Murthy, A V Bapat, A K Das</i>	
<b>UV Dichroic Coatings on Metallic Reflectors</b> .....	193
<i>C Raghunath, N J Babu, K M chandran</i>	
<b>Development &amp; Characterization of Hydrogen Reservoirs for Thyratrons and Copper Vapor Laser System</b> .....	199
<i>M S Tyagi, M Kumar, B L Meena, A Jakhar, A Mishra, H Khatun, U N Pal</i>	
<b>Design, Development and Performance of UHV Chamber for In-situ Magneto-optic Kerr Effect and Resistivity Measurements</b> .....	205
<i>D Kumar, S Potdar, V R Reddy, A Gupta</i>	

<b>Effect of Post-deposition Annealing on the Structural and Electrical Properties of Dc Magnetron Sputtered Ta<sub>2</sub>O<sub>5</sub> Films.....</b>	213
<i>S Uthanna, S V J Chandra, P S Reddy, G M Rao</i>	
<b>Intrinsic Stress of Bismuth Oxide Thin Films: Effect of Vapour Chopping and Air Ageing.....</b>	219
<i>R B Patil, R K Puri, V Puri</i>	
<b>Properties of Vacuum Evaporated Vapour Chopped Polyaniline Thin Film: Effect of Synthesis Method.....</b>	223
<i>J B Yadav, S Jhadav, R K Puri, V Puri</i>	
<b>On-line Characterisation of Copper Vapour Evolution from Linear Vapour Source Generated Using Strip Electron Beam.....</b>	226
<i>G K Sahu, A Majumder, R A Patankar, V K Mago, K B Thakur</i>	
<b>Reactive Dc Magnetron Sputtered Zirconium Nitride (ZrN) Thin Film and Its Characterization.....</b>	233
<i>B Subramanian, K Ashok, C Sanjeeviraja, P Kuppusami, M Jayachandran</i>	
<b>Microwave Studies of Thermally Oxidized Vacuum Evaporated Bismuth Thin Films on Alumina.....</b>	242
<i>S Patil, D Kulkarni, V Puri</i>	
<b>Vacuum Evaporated CdSe Thin Films and Its Some Spectral Response Characteristics.....</b>	248
<i>K Sarmah, R Sarma, H L Das</i>	
<b>Some Properties of Lithium Aluminium Silicate (LAS) Glass-ceramics Used in Glass-ceramic to Metal Compressive Seal for Vacuum Applications.....</b>	256
<i>A Ananthanarayanan, R Kumar, S Bhattacharya, V K Shrikhande, G P Kothiyal</i>	
<b>Synthesis and Characterization of Copper Nanostructures on Silicon Substrates.....</b>	263
<i>P Kanitkar, S Sen, K P Muthe, R C Aiyer, S K Gupta</i>	
<b>Mechanical Properties of Diamond Like Carbon Coatings Prepared by Microwave Electron Cyclotron Resonance Plasma Chemical Vapour Deposition Process.....</b>	268
<i>S B Singh, M Pandey, R Kishore, R Ramaseshan, N Chand, S Dash, A K Tyagi, D S Patil</i>	
<b>Microwave Electron Cyclotron Resonance Plasma Metal Organic Chemical Vapour Deposition of Y<sub>2</sub>O<sub>3</sub> Coatings.....</b>	276
<i>S A Barve, N S Nandurkar, N Chand, S B Singh, N Mithal, Jagannath, B M Bhanage, D S Patil, L M Gantayet</i>	
<b>UHV Compatible Al to SS Joining Through Electro Magnetic Forming Technique.....</b>	283
<i>N K Prasad, Y Ram, T P Sabharwal, K Pathak, M Kumar, A W Matkar, R K Rajawat</i>	
<b>Vacuum - the Ideal Environment for Welding of Reactive Materials.....</b>	289
<i>T K Saha, A K Ray</i>	
<b>Effect of Substrate Temperature on Structural Properties of Thermally Evaporated ZnSe Thin Films of Different Thickness.....</b>	297
<i>S Chaliha, M N Borah, P C Sarmah, A Rahman</i>	
<b>An Evaporation System for Film Deposition Using Electron Beam Sources.....</b>	303
<i>N Maiti, P Karmakar, U D Barve, A V Bapat</i>	
<b>Ti-Zr-V Thin Films As Non-evaporable Getters (NEG) to Produce Extreme High Vacuum.....</b>	310
<i>R K Sharma, N Mithal, Jagannath, K G Bhushan, D Srivastava, H R Prabhakara, S C Gadkari, J V Yakhmi, V C Sahnii</i>	

<b>Design and Development of High Efficiency 140W Space TWT with Graphite Collector.....</b>	<b>316</b>
<i>V Srivastava, G Purohit, R K Sharma, S M Sharma, A Bera, P V Bhaskar, R R Singh, K Prasad, V Kiran</i>	
<b>Ion Beam Imaging in a Mass Spectrometer Using an MCP Based Imaging Device.....</b>	<b>322</b>
<i>Y Kumar, R K Bhatia, S N Bindal, T K Saha, E Ravisankar, P Abhichandani, V Nataraju, V K Handu</i>	
<b>Development of a Nano Electrospray Time of Flight Setup .....</b>	<b>328</b>
<i>T Momin, A Bhowmick, S C Gadkari</i>	
<b>Scientometric Mapping of Vacuum Research in Nuclear Science &amp; Technology: a Global Perspective.....</b>	<b>334</b>
<i>B S Kademani, A Sagar, A Kumar, V Kumar</i>	
<b>Development of High Pressure-high Vacuum-high Conductance Piston Valve for Gas-filled Radiation Detectors.....</b>	<b>345</b>
<i>D N Prasad, R Ayyappan, L P Kamble, J P Singh, L V Muralikrishna, M Alex, V Balagi, P K Mukhopadhyay</i>	
<b>Outgassing Rate Measurement of Copper Plated Stainless Steel.....</b>	<b>351</b>
<i>K C Ratnakala, S K Tiwari, S K Shukla, S Kotaiah</i>	
<b>Pseudospark Switch Development for Pulse Power Modulators .....</b>	<b>356</b>
<i>B L Meena, M S Tyagi, S S P Rao, A Mishra, H Khatun, A Jakhar, M Kumar, U N Pal, A K Sharma</i>	
<b>Experimental Verification of Capture Coefficients for a Cylindrical Cryopanel of Closed Cycle Refrigerator Cryopump.....</b>	<b>363</b>
<i>S G Gilankar, P K Kush</i>	
<b>Leak Testing of Cryogenic Components — Problems and Solutions.....</b>	<b>370</b>
<i>S P Srivastava, S P Pandarkar, T G Unni, A K Sinha, K Mahajan, R L Suthar</i>	
<b>Ultra High Vacuum Testing of the New RF Cavity of INDUS-1 .....</b>	<b>378</b>
<i>R Sridhar, K C Ratnakala, B K Sindal, S K Tiwari, K K Malviya, P Bhatnagar, S K Shukla, S Kotaiah</i>	
<b>Ultra High Vacuum Test Setup for Electron Gun.....</b>	<b>384</b>
<i>M L Pandiyar, M Prasad, S K Jain, R Kumar, P R Hannurkar</i>	
<b>Modeling and Simulation of a Novel Pressure Sensor Based on the Principle of Thermal Transpiration .....</b>	<b>388</b>
<i>D Paul, S Mahalingam</i>	
<b>On Residual Gas Analysis During High Temperature Baking of Graphite Tiles .....</b>	<b>395</b>
<i>A Prakash A, P Chaudhuri, S Khirwadkar, N Chauhan, P M Raole, D Chenna Reddy, Y C Saxena</i>	
<b>Study of the Sensitivity of a Quadrupole Mass Analyzer and a Bayard Alpert Gauge with Changes in Temperature and Gas Composition.....</b>	<b>401</b>
<i>P Semwal, K S Joshi, K R Dhanani, F S Pathan, P L Thankey, D C Raval, Z Khan, R Sharma, D Sonara, H A Pathak, D C Reddy</i>	
<b>Discharge Characteristics of Dielectric Barrier Discharge (DBD) Based VUV/UV Sources.....</b>	<b>405</b>
<i>U N Pal, M Kumar, H Khatun, A K Sharma</i>	
<b>A Study on Vacuum Aspects of Electron Cyclotron Resonance Ion Source Plasma.....</b>	<b>412</b>
<i>S Ghosh, G S Taki, C Mallick, R K Bhandari</i>	

<b>Quantitative Study of Sniffer Leak Rate and Pressure Drop Leak Rate of Liquid Nitrogen Panels of SST-1 Tokamak .....</b>	<b>417</b>
<i>F S Pathan, Z Khan, P Semwal, D C Raval, K S Joshi, P L Thankey, K R Dhanani</i>	
<b>A New Vacuum Component: Fast Acting Puncture Valve .....</b>	<b>423</b>
<i>B Mallick</i>	
<b>Design and Performance of Differential Pumping System of Coating Unit .....</b>	<b>427</b>
<i>P Karmakar, N Maiti, A V Bapat</i>	
<b>Modification &amp; Alignment of Beam Line of 10 MeV RF Electron Beam Accelerator .....</b>	<b>436</b>
<i>R Barnwal, S R Ghodke, D Bhattacharjee, M Kumar, D Jayaprakash, A R Chindarkar, R L Mishra, S Dolas, S Y Kulkarni, M Kumar, Dixit K P, Acharya S, S R Barje, N K Lawangare, Saroj P C, V T Nimje, S Chandan, A R Tillu, Sharma V, R B Chavan, Yadav V, Roychowdhury P, K C Mittal, D P Chakravarthy, A K Ray</i>	

**Author Index**