



Emerging Applications of Vacuum-Arc-Produced Plasma, Ion and Electron Beams

Edited by

Efim Oks and Ian Brown

NATO Science Series

Emerging Applications Of Vacuumarcproduced Plasma Ion And Electron Beams

**Andrey A. Voevodin,Dmitry V.
Shtansky,Evgeny A. Levashov,John J.
Moore**

Emerging Applications Of Vacuum-Arc-Produced Plasma Ion And Electron Beams:

Emerging Applications of Vacuum-Arc-Produced Plasma, Ion and Electron Beams Efim Oks, Ian Brown, 2012-12-06 The NATO sponsored Advanced Research Workshop ARW on Emerging Applications of Vacuum Arc Produced Plasma Ion and Electron Beams was held at the Baikal Dunes Resort Lake Baikal Russia on June 24-28 2002 Participants were from NATO countries Belgium Czech Republic Germany Poland Turkey and the USA and from NATO partner countries Bulgaria Russia Ukraine and Uzbekistan The goal of the meeting was to bring together researchers involved in novel applications of plasmas and ion electron beams formed from vacuum arc discharges especially in less conventional or emerging scientific areas such as new perspectives on vacuum arc phenomena generation of high charge state metal ions heavy ion accelerator injection multi layer thin film synthesis biological applications generation of high current high density electron beams and more It was our hope that the meeting would engender new research directions and help to establish new collaborations prompt new thinking for research and technology applications of vacuum arc science and in general foster development of the field The Workshop was a great success as was clearly felt by all of the attendees The small number of participants at the meeting tended to encourage a high level of closeness and communication between individuals The location a small resort on the western side of Lake Baikal in the vicinity of Irkutsk was ideal the isolated location small and quiet was excellent and was most conducive to discussion among individuals and small groups quite apart from the formal presentations

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The Physics and Technology of Ion Sources Ian G. Brown, 2006-03-06 The first edition of this title has become a well known reference book on ion sources

The field is evolving constantly and rapidly calling for a new up to date version of the book In the second edition of this significant title editor Ian Brown himself an authority in the field compiles yet again articles written by renowned experts covering various aspects of ion source physics and technology The book contains full chapters on the plasma physics of ion sources ion beam formation beam transport computer modeling and treats many different specific kinds of ion sources in sufficient detail to serve as a valuable reference text

Cathodic Arcs André Anders, 2009-07-30 Cathodic arcs are among the longest studied yet least understood objects in science Plasma generating tiny spots appear on the cathode they are highly dynamic and hard to control With an approach emphasizing the fractal character of cathode spots strongly fluctuating plasma properties are described such as the presence of multiply charged ions that move with supersonic velocity Richly illustrated the book also deals with practical issues such as arc source construction macroparticle removal and the synthesis of dense well adherent coatings The book spans a bridge from plasma physics to coatings technology based on energetic condensation appealing to scientists practitioners and graduate students alike

Nanostructured Thin Films and Nanodispersion Strengthened Coatings Andrey A. Voevodin, Dmitry V. Shtansky, Evgeny A. Levashov, John J. Moore, 2006-04-11 This volume contains proceedings of the NATO Russia Advanced Research Workshop on Nanostructured Thin Films and Nanodispersion Strengthened Coatings December 2003 Moscow During this Workshop leading researchers from twelve countries had presented and discussed most recent developments in the fields of plasma physics and surface engineering related to the preparation and applications of nanostructured thin films and nanodispersion strengthened coatings These presentations are encompassed in 31 individual chapters The chapters are assembled in five parts in according to the workshop sessions Part I is a compilation of chapters on hard and tribological coatings The recent advances in this area are significant in that it is now possible to engineer strong hard and tough coatings that can operate at temperatures higher than 1200 C and exhibit smart adaptive characteristics These coatings are based on an amorphous matrix e g nitrides carbides borides or carbon in which there is a controlled nucleation and growth of ultra hard nanoparticles of crystalline carbides nitrides borides and oxides The critical feature is the control of both the particle size i e less than 10 nm and interpartical spacing of a few nanometers The smart or adaptive characteristic is engineered into the nanostructures using similar sized less than 10 nm particles of metallic chalcogenides ductile metals or glass forming elements to provide high lubricity and chemical adaptation at the environment change e g high and low humidities and temperatures

Non-Linear Dynamics and Fundamental Interactions Faqir Khanna, Davron Matrasulov, 2006-06-26 This volume contains the papers presented at the NATO Advanced Research Institute on Non Linear Dynamics and Fundamental Interactions held in Tashkent Uzbekistan from Oct 10 16 2004 The main objective of the Workshop was to bring together people working in areas of Fundamental physics relating to Quantum Field Theory Finite Temperature Field theory and their applications to problems in particle physics phase transitions and overlap regions with the areas of Quantum Chaos The

other important area is related to aspects of Non Linear Dynamics which has been considered with the topic of chaology The applications of such techniques are to mesoscopic systems nanostructures quantum information particle physics and cosmology All this forms a very rich area to review critically and then find aspects that still need careful consideration with possible new developments to find appropriate solutions There were 29 one hour talks and a total of seven half hour talks mostly by the students In addition two round table discussions were organised to bring the important topics that still need careful consideration One was devoted to questions and unsolved problems in Chaos in particular Quantum Chaos The other round table discussion considered the outstanding problems in Fundamental Interactions There were extensive discussions during the two hours devoted to each area Applications and development of new and diverse techniques was the real focus of these discussions The conference was ably organised by the local committee consisting of D U *Index of Conference Proceedings* British Library. Document Supply Centre,2003 *Sci-tech News* ,2003 *CAS, CERN Accelerator School* D. Brandt,2006 *Journal of Physics* ,2005 *The British National Bibliography* Arthur James Wells,2003 *American Book Publishing Record* ,2003 *Book Review Index* ,2004 Every 3rd issue is a quarterly cumulation **Uzbek journal of physics** ,2002 **Government Reports Announcements & Index** ,1995 *Compact Plasma and Focused Ion Beams* Sudeep Bhattacharjee,2013-12-12 Recent research has brought the application of microwaves from the classical fields of heating communication and generation of plasma discharges into the generation of compact plasmas that can be used for applications such as FIB and small plasma thrusters However these new applications bring with them a new set of challenges With coverage ranging from the basics to new and emerging applications Compact Plasma and Focused Ion Beams discusses how compact high density microwave plasmas with dimensions smaller than the geometrical cutoff dimension can be generated and utilized for providing focused ion beams of various elements Starting with the fundamentals of the cutoff problem for wave propagation in waveguides and plasma diagnostics the author goes on to explain in detail the plasma production by microwaves in a compact geometry and narrow tubes He then thoroughly discusses wave interaction with bounded plasmas and provides a deeper understanding of the physics The book concludes with an up to date account of recent research on pulsed microwaves and the application of compact microwave plasmas for multi element FIB It provides a consolidated and unified description of the emerging areas in plasma science and technology utilizing wave based plasma sources based on the author s own work and experience The book will be useful not only to established researchers in this area but will also serve as an excellent introduction to those interested in applying these ideas to various current and new applications *Advanced Technologies Based on Wave and Beam Generated Plasmas* H. Schlüter,A. Shivarova,1999-02-28 This book draws together three areas of work on plasma technologies advanced efforts based on wave generated high frequency plasmas plasma assisted ion implantation and electron beam generated plasma It lays a foundation for the application of sources in industry and various research areas **Plasma Cathode Electron Sources** Efim Oks,2007-06-27

This book fills the gap for a textbook describing this kind of electron beam source in a systematic and thorough manner from physical processes of electron emission to examples of real plasma electron sources and their applications **Electron Beams in a Plasma** Evgeniy G. Shustin, 2024-05-21 This book contains information on scientific research and applications of a very diverse field of low temperature plasma physics the interaction of electron beams with plasma and as a consequence of this interaction a beam plasma discharge It contains detailed descriptions of the history of the relevant research a review of experimental research of properties of the low temperature plasma with an electron beam and beam plasma discharge and presents the main results of beam plasma interaction theory Most of the book is devoted to descriptions of applications of the plasma with a beam and beam plasma discharge in a variety of fields from studies of the physics of near Earth space using active geophysical experiments to the development of materials technologies for micro and nanoelectronics and designs of plasma filled electronic devices This book will be useful as an introduction to this field for undergraduate and graduate students specializing in plasma physics as well as for other specialists in various fields of physics and technologies **The Electron Beam Plasma and Its Applications to Microelectronics** Zeng-qi Yu, 1990

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