

Surface Contamination

Genesis, Detection, and Control

Volume 2

Edited by

K. L. Mittal



Springer

Surface Contamination Genesis Detection And Control Volume

K.L. Mittal



Surface Contamination Genesis Detection And Control Volume :

Surface Contamination K. L. Mittal, 2012-12-06 The present volume and its companion Volume 2 document the proceedings of the Symposium on Surface Contamination Its Genesis Detection and Control held in Washington D C September 10 13 1978 This Symposium was a part of the 4th International Symposium on Contamination Control held under the auspices of the International Committee of Contamination Control Societies and the Institute of Environmental Sciences U S A was the official host The ubiquitous nature of surface contamination causes concern to everyone dealing with surfaces and the world of surfaces is wide and open ended The technological areas where surface cleaning is of cardinal importance are too many and very diversified To people working in areas such as adhesion composites adsorption friction lubrication soldering device fabrication printed circuit boards etc surface contamination has always been a bete noire In short people dealing with surfaces are afflicted with molysmophobia and rightfully so In the past the subject of surface contamination had been discussed in various meetings but this symposium was hailed as the most comprehensive symposium ever held on this important topic as the technical program comprised 70 papers by more than 100 authors from 10 countries The symposium was truly international in scope and spirit and was very well attended The attendees represented a broad spectrum of backgrounds interests and professional affiliations but all had a common interest and concern about surface contamination and cleaning

Developments in Surface Contamination and Cleaning, Volume 4 Rajiv Kohli, K. L. Mittal, 2011-10-24 The contributions in this volume cover methods for removal of particle contaminants on surfaces Several of these methods are well established and have been employed in industrial applications for a long time However the ever higher demand for removal of smaller particles on newer substrate materials is driving continuous development of the established cleaning methods and alternative innovative methods for particle removal This book provides information on the latest developments in this topic area The purpose of the Developments in Surface Contamination and Cleaning series is to provide a state of the art guide to the current knowledge of the behaviour of film type and particulate surface contaminants and cleaning methods Each title has a particular topical focus covering the key techniques and recent developments in the area Taken as a whole the series forms a unique reference for professionals and academics working in the area of surface contamination and cleaning A strong theme running through the series is that of surface contamination and cleaning at the micro and nano scales Covers the latest techniques in areas such as removal of nanoparticles especially important in the semiconductor industry disk drives and microelectronics The series as a whole represents the definitive reference on Surface Contamination and Cleaning An essential reference for industries where cleaning is critical electronics optics pharmaceutical manufacturing etc

Developments in Surface Contamination and Cleaning Rajiv Kohli, Kashmiri L. Mittal, 2008-01-10 Surface contamination is of cardinal importance in a host of technologies and industries ranging from microelectronics to optics to automotive to biomedical Thus the need to understand the causes of surface contamination and their removal is very patent

Generally speaking there are two broad categories of surface contaminants film type and particulates In the world of shrinking dimensions such as the ever decreasing size of microelectronic devices there is an intensified need to understand the behavior of nanoscale particles and to devise ways to remove them to an acceptable level Particles which were functionally innocuous a few years ago are killer defects today with serious implications for yield and reliability of the components This book addresses the sources detection characterization and removal of both kinds of contaminants as well as ways to prevent surfaces from being contaminated A number of techniques to monitor the level of cleanliness are also discussed Special emphasis is placed on the behaviour of nanoscale particles The book is amply referenced and profusely illustrated Excellent reference for a host of technologies and industries ranging from microelectronics to optics to automotive to biomedical A single source document addressing everything from the sources of contamination to their removal and prevention Amply referenced and profusely illustrated

Developments in Surface Contamination and Cleaning, Volume 8
Rajiv Kohli, Kashmiri L. Mittal, 2014-11-19 As device sizes in the semiconductor industries shrink devices become more vulnerable to smaller contaminant particles and most conventional cleaning techniques employed in the industry are not effective at smaller scales The book series Developments in Surface Contamination and Cleaning as a whole provides an excellent source of information on these alternative cleaning techniques as well as methods for characterization and validation of surface contamination Each volume has a particular topical focus covering the key techniques and recent developments in the area Several novel wet and dry surface cleaning methods are addressed in this Volume Many of these methods have not been reviewed previously or the previous reviews are dated These methods are finding increasing commercial application and the information in this book will be of high value to the reader Edited by the leading experts in small scale particle surface contamination cleaning and cleaning control these books will be an invaluable reference for researchers and engineers in R D manufacturing quality control and procurement specification situated in a multitude of industries such as aerospace automotive biomedical defense energy manufacturing microelectronics optics and xerography Provides a state of the art survey and best practice guidance for scientists and engineers engaged in surface cleaning or handling the consequences of surface contamination Addresses the continuing trends of shrinking device size and contamination vulnerability in a range of industries spearheaded by the semiconductor industry and others Covers novel wet and dry surface cleaning methods of increasing commercial importance

Particles on Surfaces 3 K.L. Mittal, 2013-11-11 This volume chronicles the proceedings of the Third Symposium on Particles on Surfaces Detection Adhesion and Removal held as a part of the 21st Annual Meeting of the Fine Particle Society in San Diego California August 21 25 1990 The first two symposia in this series were held in 1986 and 1988 respectively and have been properly documented 2 Like its antecedents the Third symposium was very well received and the continuing success of these symposia reinforced our earlier belief that regular symposia on the topic of particles on surfaces were very much needed Concomitantly the fourth

symposium in this series is planned in Las Vegas July 13 17 1992. As pointed out in the Preface to the earlier two volumes the topic of particles on surfaces is of tremendous interest and concern in a wide spectrum of technological areas. The objectives of the Third symposium were essentially the same as those of the earlier two and our intent here was to provide an update on the research and development activities in the world of particles on surfaces. Apropos there has been a deliberate attempt every time to seek out new people to present their research results and we have been very successful in this mission.

Particles on Surfaces 2 K.L. Mittal, 2012-12-06 This volume documents the proceedings of the Second Symposium on Particles on Surfaces Detection Adhesion and Removal held as part of the 19th Annual Meeting of the Fine Particle Society in Santa Clara California July 20 25 1988. The premier symposium on this topic was organized in 1986 and has been properly chronicled. Based on the success of these two events and the high interest evinced by the technical community we plan to regularly hold symposia on this topic on a biennial basis and the next one is slated for August 20 24 1990 in San Diego California. As pointed out in the Preface to the first volume the topic of particles on surfaces is of paramount importance in a legion of technological areas. Particularly in the semiconductor device fabrication area all signals indicate that the understanding of the behavior of particles on surfaces and their removal will attain heightened importance in the times to come. As the device dimensions are shrinking at an accelerated pace so the benign particles of today will become the killer defects in the not too distant future. The tempo of research and development activity in the field of particles on surfaces is very high and better and novel ways are continuously being devised to remove smaller and smaller particles.

Developments in Surface Contamination and Cleaning: Applications of Cleaning Techniques Rajiv Kohli, K.L. Mittal, 2018-11-27. Developments in Surface Contamination and Cleaning Applications of Cleaning Techniques Volume Eleven part of the Developments in Surface Contamination and Cleaning series provides a guide to recent advances in the application of cleaning techniques for the removal of surface contamination in various industries such as aerospace automotive biomedical defense energy manufacturing microelectronics optics and xerography. The material in this new edition compiles cleaning applications into one easy reference that has been fully updated to incorporate new applications and techniques. Taken as a whole the series forms a unique reference for professionals and academics working in the area of surface contamination and cleaning. Presents the latest reviewed technical information on precision cleaning applications as written by established experts in the field. Provides a single source on the applications of innovative precision cleaning techniques for a wide variety of industries. Serves as a guide to the selection of precision cleaning techniques for specific applications.

Treatise on Clean Surface Technology K.L. Mittal, 2012-12-06 Particles on Surfaces 1 K.L. Mittal, 2012-12-06 This volume chronicles the proceedings of the Symposium on Particles on Surfaces Detection Adhesion and Removal held under the auspices of the Fine Particle Society in San Francisco July 28 August 2 1986. The study of particles on surfaces is extremely important in many areas of human endeavor ranging from microelectronics to optics to biomedical. A

complete catalog of modern precision and sophisticated technologies where particles on surfaces are of cardinal importance will be prohibitively long but the following eclectic examples should underscore the concern about particles on a variety of surfaces In the semiconductor world of shrinking dimensions particles which a few years ago were cosmetically undesirable but functionally innocuous can potentially be killer defects now As the device sizes get smaller there will be more and more concern about smaller and smaller particles In the information storage technology the gap between the head and the disk is very narrow and if a particle is trapped in the gap that can have very grave consequences The implications of particulate contamination on sensitive optical surfaces is all too manifest So the particulate contamination on surfaces is undesirable from functional yield and reliability points of view This symposium was organized with the following objectives in mind to bring together active practitioners in this field to provide a forum for discussion of the latest research and development activities in this area to provide opportunity for cross pollination of ideas and to highlight topics which needed intensified effort

Surfactants in Tribology, Volume 1 Girma Biresaw, K.L. Mittal, 2008-06-04 Surfactants play a variety of critical roles in tribology In addition to controlling friction and wear they also allow for control of a wide range of properties of lubricants such as emulsification demulsification bioresistance oxidation resistance and rust corrosion prevention This book explains recent advances in the role of surfactants with

Particles in Gases and Liquids 3 K.L. Mittal, 2013-11-11 This book documents the proceedings of the Third Symposium on Particles in Gases and Liquids Detection Characterization and Control held as a part of the 22nd Annual Meeting of the Fine Particle Society in San Jose California July 29 August 2 1991 This series of symposia was initiated in 1987 in light of the growing importance to eliminate particles from process gases and liquids As pointed out in the Preface to antecedent volumes in this series that particles in process gases and liquids could cause significant yield losses in precision manufacturing and concomitantly there has been heightened interest in understanding the behavior of particles in gases and liquids and devising ways to eliminate or at least reduce substantially these particles The concern about particles in gases and liquids has been there for quite some time in the microelectronics arena but there are other areas also where particles are of significant concern e g in operation theatres in hospitals food and beverage industry and pharmaceutical manufacturing This symposium basically had the same objectives as its predecessors but to provide an update on the R D activity taking place in the arena of particle detection characterization and control The printed program comprised a total of 28 papers dealing with variegated aspects of particles in gases and liquids There were brisk and lively discussions and the attendees offered many positive comments which goes to show that it was a well received and needed symposium

Developments in Surface Contamination and Cleaning: Methods for Surface Cleaning Rajiv Kohli, Kashmiri L. Mittal, 2016-11-04 Developments in Surface Contamination and Cleaning Methods for Surface Cleaning Volume 9 part of the Developments in Surface Contamination and Cleaning series provide a state of the art guide to the current knowledge on the behavior of film type and particulate surface contaminants and their associated cleaning methods

This newest volume in the series discusses methods of surface cleaning of contaminants and the resources that are needed to deal with them. Taken as a whole the series forms a unique reference for professionals and academics working in the area of surface contamination and cleaning. A strong theme running through the series is that of surface contamination and cleaning at the micro and nano scales. Provides a comprehensive coverage of innovations in surface cleaning. Written by established experts in the surface cleaning field presenting an authoritative resource. Contains a comprehensive review of the state of the art including case studies to enhance the learning process.

Surfactants in Tribology, 2 Volume Set Girma Biresaw, K.L. Mittal, 2011-06-17 Surfactants play a critical role in tribology as they control friction wear and lubricant properties such as emulsification, demulsification, bioresistance, oxidation resistance, rust prevention and corrosion resistance. The use of surfactants in tribology is a critical topic for scientists and engineers who are developing new materials and devices.

Particles in Gases and Liquids 2 K.L. Mittal, 2013-11-11 This book chronicles the proceedings of the Second Symposium on Particles in Gases and Liquids: Detection, Characterization and Control, held as a part of the 20th Annual Fine Particle Society meeting in Boston, August 21-25, 1989. As this second symposium was as successful as the prior one, so we have decided to hold symposia on this topic on a regular biennial basis and the third symposium in this series is scheduled to be held at the 22nd Annual Meeting of the Fine Particle Society in San Jose, California, July 29-August 2, 1991. As pointed out in the Preface to the prior volume in this series, that recently there has been tremendous concern about yield losses due to unwanted particles and these unwelcome particles can originate from a legion of sources including process gases and liquids. Also, all signals indicate that in the future manufacture of sophisticated and sensitive microelectronic components with shrinking dimensions and other precision parts, the need for detection, characterization, analysis and control of smaller and smaller particles will be more intensified.

Physicochemical Aspects of Polymer Surfaces K. L. Mittal, 2013-03-13 This and its companion Volume 2 document the proceedings of the International Symposium on Physicochemical Aspects of Polymer Surfaces held under the auspices of the American Chemical Society in New York City, August 23-28, 1981. This event was sponsored by the Division of Colloid and Surface Chemistry and the Divisions of Organic Coatings and Plastics Chemistry and Industrial and Engineering Chemistry were the cosponsors. The study of polymer surfaces is important from both fundamental and applied points of view. The applications of polymers are legion and wherever polymers are used, their surface characteristics, inter alia, are of great concern and importance and the areas where polymers find applications range from microelectronics to prosthetics. In the last decade or so, the availability of various sophisticated surface analytical techniques, particularly ESCA, has been a boon in enhancing our knowledge of polymer surfaces. This Symposium was designed to bring together scientists and technologists interested in all aspects of polymer surfaces to provide a forum for discussion of various ramifications of polymer surfaces, to discover the latest developments, to provide an opportunity for cross-pollination of ideas and to highlight areas which are in a state of rapid development and those which need intensified efforts. If the comments

from attendees is any barometer of the success of an event then this Symposium was a grand success and the above objectives were amply fulfilled

Particles in Gases and Liquids 1 K.L. Mittal, 2012-12-06 This book documents the proceedings of the Symposium on Particles in Fluids Detection Characterization and Control held as a part of the 18th Fine Particle Society meeting in Boston August 3-7 1987 This was the Premier symposium on this topic and the response was so good that we have decided to organize it on a biennial basis and the second symposium will be held under the rubric Particles in Gases and Liquids Detection Characterization and Control at the 20th Fine Particle Society meeting in Boston August 22-26 1989 In the modern manufacture of sophisticated and sensitive microelectronic components and other precision parts there has been a great deal of concern about yield losses due to micrometer and submicrometer sized particles These particles can originate from a number of sources including fluids i.e. gases and liquids used in the manufacturing process So the detection characterization and control or removal of these undesirable particles is of cardinal importance and this symposium was conceived and organized with this in mind The purposes of this symposium were to bring together those actively involved in all aspects of particles in fluids to provide a forum for discussion of the latest techniques for the detection characterization and control of particles and to highlight areas which needed intensified R D efforts The printed program contained a total of 46 papers and a variety of topics dealing with various ramifications of particles in fluids were presented

Polymers in Information Storage Technology K.L. Mittal, 2012-12-06 This volume documents the proceedings of the Symposium on Polymers in Information Storage Technology held as a part of the American Chemical Society meeting in Los Angeles September 25-30 1988 It should be recorded here that this symposium was cosponsored by the Division of Polymeric Materials Science and Engineering and the Division of Polymer Chemistry Polymers are used for a variety of purposes in both optical and magnetic information storage technologies For example polymers find applications as substrate for storing information directly as protective coating as lubricant and as binder in magnetic media In the last few years there has been a high tempo of research activity dealing with the many ramifications of polymers in the exciting arena of information storage Concomitantly we decided to organize this symposium and I believe this was the premier event on this topic This symposium was conceived and organized with the following objectives in mind 1 to bring together those actively involved polymer chemists polymer physicists photochemists surface and colloid chemists tribologists and so on in the various facets of this topic 2 to provide a forum for discussion of latest R 3 to provide an opportunity for cross pollination of ideas and 4 to identify and highlight areas within the broad purview of this topic which needed intensified or accelerated R D efforts

Metallized Plastics 3 K.L. Mittal, 2012-12-06 This volume chronicles the proceedings of the Third Symposium on Metallized Plastics Fundamental and Applied Aspects held under the auspices of the Dielectric Science and Technology Division of the Electrochemical Society in Phoenix Arizona October 13-18 1991 This series of symposia to address the subject of metallized plastics was initiated in 1988 and the premier symposium was held in Chicago October 10-12 1988 followed by

the second event in Montreal Canada May 7 10 1990 The proceedings of these two symposia have been properly documented 2 The third symposium was a huge success like the previous two events and all this is testimonial to the brisk interest and high tempo of R D activity in the field of metallized plastics This further bolsters our earlier thinking that there was a conspicuous need to hold symposia on this topic on a regular basis and the fourth is planned for May 16 21 1993 in Honolulu Hawaii The study of metallized plastics constitutes an important human endeavor and as pointed out earlier there are myriad applications of metallized plastics ranging from very commonplace to exotic Also a survey of the recent literature will reveal that both the fundamental and applied aspects of metallized plastics are being pursued with great vigor **Particles**

on Surfaces: Detection, Adhesion and Removal, Volume 9 Kash L. Mittal, 2006-06-01 This volume chronicles the proceedings of the 9th International Symposium on Particles on Surfaces Detection Adhesion and Removal held in Philadelphia PA June 2004 The study of particles on surfaces is crucially important in a legion of diverse technological areas ranging from microelectronics to biomedical to space This volume contains a to **Surfactants in Solution** K.L. Mittal, P. Botherel, 2013-03-09 This and its companion Volumes 4 and 6 document the proceedings of the 5th International Symposium on Surfactants in Solution held in Bordeaux France July 9 13 1984 This symposium was the continuation of the series of symposia initiated in 1976 in Albany New York under the title Micellization Solubilization and Microemulsions The next two symposia were labelled Solution Chemistry of Surfactants and Solution Behavior of Surfactants Theoretical and Applied Aspects held in Knoxville TN in 1978 and Potsdam N Y in 1980 respectively In 1982 at the time of the 4th Symposium in this series it became amply evident that there was a definite need to have more a generic title to describe these biennial events and after much deliberation it was decided that an appropriate title would be Surfactants in Solution as both the aggregation and adsorption aspects of surfactants were addressed So the 4th Symposium was held in Lund Sweden under this new rubric and it was decided to continue these symposia in the future under this appellation Naturally the Bordeaux Symposium was dubbed as the 5th International Symposium on Surfactants in Solution and our logo became SIS which is very apropos and appealing It was in Bordeaux that the decision was made to hold the 6th SIS Symposium in New Delhi and it is scheduled for August 18 22 1986 in the capital of India

Reviewing **Surface Contamination Genesis Detection And Control Volume** : Unlocking the Spellbinding Force of Linguistics

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