



High Voltage Vacuum Insulation: A New Perspective

By Rodney Latham

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This short monograph is a sequel to the author's previous two reference books on the subject of High Voltage Vacuum Insulation, and will be of interest to all of those involved in both fundamental research and the technological development of practical high voltage devices. Its aim is to offer an improved understanding of the operational behaviour of the high voltage vacuum gap, with particular reference to the physical origin of the prebreakdown current-voltage characteristic, and the subsequent breakdown mechanism. It introduces a range of new insights into the fundamental physical processes that operate in an "open" vacuum gap, i.e. one that is not bridged by a solid insulator, and suggests a number of diagnostic techniques that could be used to investigate these processes. In particular, it highlights the important role played by the anode which, hitherto, has conventionally been seen as a relatively passive partner in the vacuum gap. A chapter has also been devoted to a discussion of the primary, particulate-based, field-induced electron emission mechanism which is widely believed to be the precursor of gap breakdown. Finally, consideration is given as to how these new insights might influence existing technological practice, and lead to new innovative approaches for improving the insulating performance of a vacuum gap. The book has drawn extensively on the material contained in the author's 1995 book "High Voltage Vacuum Insulation: Basic Concepts and Technological Practice", and has been written in a conceptual style that makes it comprehensive to a newcomer to the field.

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Editorial Review

About the Author

Professor Rod Latham followed both his undergraduate and postgraduate education at Queen Mary College, University of London, receiving his B.Sc Honours Degree in Physics in 1958, and his PhD in 1963: in 1984, London University also awarded him a D.Sc for his contribution to the field of Surface Science. He is a Fellow of both the Institutions of Physics and Electrical Engineering, and is a Chartered Engineer. In 1990, he was appointed Professor of Applied Physics in the Department of Electronic Engineering and Applied Physics, having previously served as its Head. Subsequently, he held the post of Pro-Vice Chancellor of the University with special responsibility for research. His own research interest has centred on how solid surfaces respond to high electric fields under vacuum conditions, with particular reference to the phenomenon of "cold" or field-induced electron emission. From a technological perspective, this translated, on the one hand, into the development of new types of electron sources, and on the other, into improving the voltage hold-off performance of vacuum-insulated devices and systems. In this context, he received extensive financial support over the years from the UK, EU and US funding agencies. Professor Latham has written two specialist reference books of the subject and published over 100 scientific papers. He has been a member of the permanent scientific committees of ISDEIV and EIDP international scientific conferences, and was the IEEE Whitehead Memorial Lecturer at the 1988 EIDP conference in Ottawa. He has also held senior visiting appointments at the Ecole Supérieure d'Electricité in Paris, the University of Geneva, and CERN. He took early retirement in 1996 to become Emeritus Professor in Applied Physics at Aston University, and has remained active in the field through reflecting on theoretical aspects of the subject, and being involved in the occasional consultancy project.

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