Monday Morning, November 3, 2003

Vacuum Technology
Room 310 - Session VT-MoM
Looking Back: Fifty Years of Vacuum Science and Technology

Moderator: B.R.F. Kendall, Elvac Laboratories

8:40am **VT-MoM2 Fifty Years of Vacuum Science***, E.V. Kornelsen,* Unaffiliated, Canada **INVITED**

A selection is presented of problems in the physics and chemistry of vacuum systems and devices which has attracted considerable research during the past 50 years. These include examples where the limiting gas sources are water vapor, hydrogen, or helium. Also considered are self-sustained crossed-field discharges and the interaction of molecules, electrons, ions, and photons with the "technical" surfaces found in most vacuum systems.@footnote 1@ @FootnoteText@ This manuscript was prepared by J.P.Hobson shortly before his death.

9:20am **VT-MoM4 The Measurement of Vacuum;1950-2003***, P.A. Redhead,* National Research Council, Canada **INVITED**

The major developments in the measurement of vacuum since the Bayard-Alpert gauge was invented in 1950 are reviewed.These include a) improvements in understanding the processes limiting the lowest measurable pressure (both total and partial), b) development of new gauges, residual gas analysers,and optical methods to reduce these limitations, c) introduction of room temperature electron sources to replace thermionic cathodes,and d) development of the spinning rotor gauge as a secondary standard.

10:00am **VT-MoM6 Major Advances in Capture Pumps in the Last 50 Years***, K.M. Welch,* Consultant **INVITED**

Capture pumps either temporarily or permanently remove and store gases from a vacuum system by pumping mechanisms including chemisorption, physisorption and particle implantation on pumping surfaces. All or only some of these pumping mechanisms might come into play depending on the type of capture pump. Momentum transfer pumps, having no inherent capacity limitation, whisk gases through their innards, compressing the gases for removal at a pump outlet. Because capture pumps retain pumped gases, they have inherent capacity limitations. Developments of capture pumps focused on improving both the capacity and throughput of these pumps. Some of the major advances in the development and use of capture pumps in the last fifty years are given. Specifically, comments are included on the developments of nonevaporable getters, sputter-ion pumps, titanium sublimation pumps and cryopumps during this period.

10:40am **VT-MoM8 Major Advances in Transfer Pumps; 1953-2003***, M.H. Hablanian,* Varian Inc. **INVITED**

The major advances made in the design and operation of transfer pumps (i.e. vacuum pumps that transfer gas from a vacuum system to the atmosphere) during the lifetime of the American Vacuum Society (1953-2003) are reviewed. Included are vapor-jet, turbomolecular, and oil-free mechanical pumps. In addition to engineering development of pump designs, the basic understanding of pumping mechanisms of various pumps and their performance parameters has been greatly improved during this period.

11:20am **VT-MoM10 The Development of Ultrahigh and Extreme High Vacuum Technology for Physics Research@footnote 1@***, H.F. Dylla,* Jefferson Lab **INVITED**

Over the last 50 years, increasingly large and more sophisticated devices have been designed and put into operation for the study of particle and nuclear physics, magnetic confinement of high temperature plasmas for thermonuclear fusion research, and gravity wave observatories based on laser interferometers. The evolution of these devices has generated many developments in ultrahigh and extreme high vacuum technology that were required for these devices to meet their operational goals. The technologies that were developed included unique ultrahigh vacuum vessel structures, ultrahigh vacuum compatible materials, surface conditioning techniques, specialized vacuum pumps and vacuum diagnostics. Associated with these technological developments are scientific advancements in the understanding of outgassing limits of UHV-compatible materials and particle-induced desorption effects. @FootnoteText@@footnote 1@ This work supported by the U.S. DOE Contract No. DE-AC05-84ER40150.

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