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## 32. Ian Macmillan Ward

Otto Vogl

University of Massachusetts - Amherst, vogl@polysci.umass.edu

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## Personalities in Polymer Science



Ian Macmillan Ward

### Honoring Ian Ward on his 70th Birthday

Ian Ward is a leader in Material Science in the UK and in the world. His contributions to polymer physics, fiber technology and the properties of oriented solid polymers are numerous and documented in a multitude of publications. He has demonstrated unusual talents as collaborator, coordinator and manager of scientific projects.

Ian Ward was born on April 9, 1928 at Stockton on Tees, the son of Harry Ward and Joan Ward, who were in the British Government Service.

Ian Ward grew up in the North of England, first on Teesside and then on Tyneside finally attending the Royal Grammar School in Newcastle-upon-Tyne. After National Service in the Royal Air Force he went up to Magdalen College of Oxford University, receiving his B.A. in Physics in 1951. He carried out post graduate research on the electron spin resonance behavior of inorganic complexes and irradiated materials under the guidance of Dr. James Griffiths. The title of his thesis was "Experimental Investigation of Paramagnetic Resonance at Very High Frequencies," and he was awarded a Ph.D. from Oxford University in 1954.

After receiving his degree Ian Ward joined the Fibers Division of ICI and carried out research on the physical

properties of fibers and used infrared and NMR spectroscopy for this task. During this time he was a Technical Officer of the Fibers Division of ICI in Harrogate, and worked for short periods on the Terylene plant at Wilton, at Welwyn Garden City, and Billingham.

In 1961, ICI sent Ian to the U.S.A. to broaden his scientific background at Brown University as a Research Associate in the Department of Applied Mathematics. After returning from the U.S.A. he was appointed the Head of the Basic Physics Section at the ICI Fibers Division and was subsequently named a Research Associate of ICI in 1965.

In 1966, Ian Ward returned to academic life. He was offered and accepted the position of a Senior Lecturer in Physics of Materials at the H. H. Wills Laboratory of the University of Bristol. In 1970 he was offered the position of a chair in Physics at the University of Leeds which he accepted. He has held this position ever since and served as the Chairman of the department from 1975 to 1978 and from 1987 to 1989. Since 1987, Ian Ward has held the prestigious position of Cavendish Professor and became Professor Emeritus in 1994.

Ian Ward is not only a leading scientist of the highest global reputation, but also an outstanding organizer and manager. Before moving from the University of Bristol he had already built a new "Polymer Research Group" of significant scientific reputation which attracted substantial funding both from the government and from industry.

The Polymer Group which Ward created in Leeds was primarily concerned in the broadest sense which the structure and properties of solid polymers with particular interest in the development of very highly oriented polymers.

In the late 1980's it became clear that a need and a possibility existed in the UK to create a Interdisciplinary Research Center (IRC) for Polymer Science and Technology. Ian Ward recognized that it was essential to collaborate with other Universities. In cooperation with the Universities of Leeds, Bradford and Durham a successful bid was made for the establishment of the IRC. In 1989 Ian Ward was appointed the first director of the IRC, a position he held until 1994. Since then he is Research Professor of Polymer Science and Technology at the University of Leeds and at IRC.

Ward's research interests include the fabrication of oriented polymers, drawing of fibers and films, hydrostatic extrusion, and die-drawing of rods, sheets and tapes. He is also actively involved in research programs on the physical properties and structure of oriented polymers. Studies on physical properties of polymers include mechanical anisotropy, yield and fracture, thermal expansion and barrier properties. Structural studies include X-ray diffraction, infrared spectroscopy and NMR. His latest research involves novel composites and gel rechargeable lithium batteries for which he has founded two University based companies.

Ian Ward has extensive experience of collaborative research projects with many industrial organizations and has consulted widely on the physical behavior, structure and processing of polymers.

The esteem in which Ian Ward's work is held can be judged from his many Honors and Awards.

He was elected a Fellow of the Royal Society in 1983 and was the President of the British Society of Rheology from 1984-86. In 1994 he received a Hon DSc., from Bradford University.

Awards include the A. A. Griffith Silver Medal in Material Science in 1982; the S. G. Smith Memorial Medal of the Textile Institute in 1984, the Swinburne Medal of the Plastics & Rubber Institute in 1988; and the Charles Vernon Boys Medal and Prize of the Institute of Physics in 1993.

Ian Ward is a Fellow of the Institute of Physics and the Plastics and Rubber Institute and was one of the co-founders of the British Polymer Physics Research Group for which he was secretary (1963-71) and was its Chairman from 1971 to 1976. From 1976 to 1981 he served as the Chairman of the Macromolecular Physics Group of the European Physical Society.

In addition to his regular profession, Ian Ward held such diverse positions as Research Associate at the ICI Petrochemicals and Polymer Laboratory, Runcorn, he was a Member of the Textile Advisory Board of the Cotton, Silk & Man-Made Fiber Research Association, a Member of several Royal Society Committees, a Member of SERC Committees and a Member of several MOD Committees. In addition to other appointments, he was also a Member of the Hull University Court.

Ian Ward is a prolific writer and author. He published over 500 papers on Polymer

Science and Technology. His textbook entitled *Mechanical Properties of Solid Polymers* (1971, second edition 1983) is the standard book in its field, as is his book (with D. W. Hadley in 1993); *Introduction to Mechanical Properties*. He has also edited several books on polymer science. He is currently an Editor of *Polymer* and the *Solid State Science Series* (Cambridge University Press). He is also on the Editorial Boards of the *Journal of Polymer Science*, *Journal of Applied Polymer Science*, *Journal of Macromolecular Science (Physics)*, *Journal of Material Science and Plastics & Rubber Processing and Applications*.

Ask any of his colleagues for a description of Ian Ward and you will get unanimous reference to his enthusiasm and energy. Thus despite his many achievements, perhaps his greatest legacy is the polymer scientists and technologists who have trained under him and who have inherited his love of his subject and perhaps a little of his work ethic. Indeed, five of his former students are now Professors themselves and numerous others are active in industry or academia. In addition, his textbooks on the mechanical properties of solid polymers have introduced students world-wide to polymer research.

Ian Ward is interested in music and plays the piano whenever he finds time. He likes to play chamber music with his younger son Alan who is a good violinist. Ward also enjoys walking and helps his wife who is a keen gardener.

In 1960 Ian Ward married Margaret Linley. His wife is very active in social affairs, is the Secretary of the Leeds Art Fair and other matters related to Art and a Director of Forest Hills, a Housing Development for the Elderly.

The Wards have two sons and one daughter. The elder son Andrew is a Polymer Engineer, and has a Ph.D. from Manchester Metropolitan University. The daughter Alice teaches Pharmacy at Guy's Hospital in London, and the younger son Alan has degrees in Marketing Engineering and Information Technology and works for Logica, a computer services company.

This article was prepared by Otto Vogl, Department of Polymer Science and Engineering, University of Massachusetts, Amherst, MA, 01003, USA.