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Polymer 47 (2006) 5431–5432
polymer
www.elsevier.com/locate/polymer

Editorial

Special issue honouring Professor David Bassett on the occasion of his retirement

The present special edition includes 28 contributions from friends and colleagues of David Bassett. These contributions have been gathered as tributes to David on the occasion of his retirement. Although, slightly delayed as compared to the official date of the retirement due to organizational problems among the editors—for which they apologize to the authors—the number of contributions and the spontaneous acceptance to contribute illustrate the very remarkable mark that David has imprinted on polymer science.

According to his web site, David locates his scientific interests 'in the central area of Polymer Physics, structure/property relationships, namely fundamental studies of textural organization and its formation, from molecular to macroscopic dimensions, within semi-crystalline polymers, especially polyethylene and polypropylene, with applications to a wide variety of interesting polymeric materials and their (mostly mechanical) properties'.

This description actually hides a string of remarkable contributions to our understanding of polymer structure and properties. David has been associated with—has actually performed most of the experimental work on—the single crystals of polymers during his PhD work at Bristol with Prof Andrew Keller, in the early days of this emerging field of polymer physics. These contributions laid the fundamentals of lamellar polymer structure, and are all too familiar to all of us to require further elaboration here. Already in those early days, David developed a keen interest in designing original preparative and observation methods that would become one of his trademarks. For example, he developed the so-called detachment replica technique that stabilizes in a multilayer polymer structure only the top layer through interaction of its folds with a layer of carbon deposited on it. As with many other of David's innovations, this technique has been used in different later studies, and has been extended recently to oriented, fiber-like polymers, providing a means to stabilize them well beyond their nominal melting temperature.

During a 2-year postdoctoral stay at Bell Laboratories in Murray Hill (NJ, USA)—a major centre of polymer science at the time—David investigated, among other things, the non-planarity of polyoxymethylene and poly(4-methyl-1-pentene) single crystals by dark field electron microscopy, again setting experimental and academic standards.

David spent the rest of his career at the University of Reading, in England, which he joined in 1964, as a Lecturer in Physics, but moving on quickly to become Reader in Physics, Professor of Physics (1984), Head of Department (1988), Professor of Polymer Physics (established Chair in 1996). It is in Reading that he made many of his major contributions to the field of structure and properties of crystalline polymers. The organization of crystalline polymers depends on the impact and interplay of many different levels of structure ranging, to use David's words, from molecular to macroscopic. Revealing the internal arrangement in, e.g. spherulites remained a challenge until David, in association with Robert Olley, designed a clever etching technique ('permanganic etching') for solid polyolefin materials, later extended to polyesters, etc. Peeling off successive stages of the growth process (either 'spontaneous', in spherulites, or 'directed' by nucleation on, e.g. high modulus polyethylene fibres) made it possible to access details of the genesis and subsequent three-dimensional development of crystal lamellae, the building blocks of polymer spherulites. The permanganic etching technique has become indispensable in the polymer community, achieving the ultimate status, when the authors are no longer cited.

Other equally important contributions could be mentioned: the development of a quenching technique of a bulk-crystallized sample followed by selective dissolution of the quenched material to extract, for example, single crystals produced at

doi:10.1016/j.polymer.2006.03.113

high temperature in the bulk—another first in polymer science. More importantly certainly is the fundamental analysis of crystallization under high pressure of polyethylene. As recounted by David, this topic was brought up when he took up his position at Reading, where materials at high pressure were investigated extensively. Combining his interest in polymers with the Department's interest in high pressure was the opening gate to his new position. David established the existence and the domain of stability of the hexagonal phase of polyethylene and its impact on polyethylene crystal growth, a topic that has been much investigated throughout later years. It has also a direct bearing on the analysis of modern nucleation and growth schemes, as illustrated in one of David's most recent papers (Adv Polym Sci 2005;180:1–16).

David held many administrative and honorary positions in the polymer science community at the national, European and international levels. Among others, he has been the Chairman of the Polymer Physics Group (Institute of Physics and Royal Society of Chemistry, UK), and Chairman of the Macromolecular Board of the European Physical Society. In the 1980s, thanks to David, Reading was repeatedly the venue of the Biennial Meetings of the Polymer Physics Group. For many years he has served as a member of the Editorial Advisory Board of this Journal, in which he published a number of his major contributions. In his present position as Emeritus Professor of Physics at the University of Reading, we will benefit from his experience and scientific creativity for many more years.

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Accepted 6 March 2006
Available online 24 May 2006

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