Fluoroplastics, Vol. 1 - Non-Melt Processible Fluoroplastics

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336 pp.-$113

Fluoropolymers occupy a special niche among thermoplastics because of their excellent chemical and thermal stability. Because of their low dielectric constant and low dielectric loss, they are often selected for electrical equipment and microelectronics, including printed wiring boards. This book is part of a two-volume set and covers homopolymers of tetrafluoroethylene (TFE) and chlorotrifluoroethylene (CTFE). Volume 2 describes vinylidene fluoride homopolymers and copolymers.

The initial chapters describe the types of fluoropolymers, such as PTFE, perfluoroalkoxy (PFA), perfluorinated ethylene-propylene copolymer (FEP), ethylene-tetrafluoroethylene copolymer (ETFE), and polyvinylidene fluoride (PVDF), including synthesis of monomers, polymerization, characterization techniques, and commercial grades. The second section describes processing techniques for granular, fine powders, micro powders, and dispersion of PTFE as well as PCTFE. Compounding and properties of filled PTFE are described in a single chapter including compounds with glass fibers, carbon blacks, carbon fiber, graphite, bronze, and molybdenum disulfide. Properties of fluoropolymers are described in the final section. In this book, chemical properties include chemical compatibility and permeability to water vapor and other gases. Mechanical, electrical, and thermal properties of PTFE and PCTFE are discussed in two separate chapters. The chapter on PCTFE in particular offers good coverage of the electrical properties. Thermal properties and mechanical properties are often a concern when using fluoropolymers, and those are covered in these two chapters. Another chapter describes special techniques required for machining, adhesive bonding, and welding or thermoforming these materials. A variety of applications are described in another chapter in this section. Wire and cable are the only electrical applications discussed. The final chapter pertains to safety and disposal issues. Additional permeability data are given in appendices. On the whole, this book gives thorough coverage to the synthesis, processing, and properties of PTFE and PCTFE. For detailed discussion of electrical properties, however, one would need to use another source.

—K. F. Schoch, Jr.

Chip Scale Packaging for Modern Electronics

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438 pp.-$196.00, 2003

A Chip Scale Package (CSP) of integrated circuit devices is one in which the package is only slightly larger than the integrated circuit die and in which the leads are 1 mm or less apart. There are many types of CSP currently on the market, such as leadless chip carriers, rigid substrate, flexible interposer, and wafer level package. This book is divided into sections on the CSP market, the technology behind various types of CSP, and reliability issues for CSP. Two short introductory chapters describe CSP and their applications. Then, the book moves into design guidelines for printed wiring boards used with CSP, interconnection standards for CSP, and BGA standards. These chapters provide an excellent introduction to CSP, how to apply them successfully, and how they contrast with similar packages. Encapsulants are compared in a separate chapter, which includes some useful summary tables comparing the properties of various classes of encapsulating resins and fillers. The second section includes chapters describing specific types of CSP, such as flip-chips, ceramic flip-chips, bottom-leaded plastic packages, quad flat packs, leadless small outline packages, flex circuit-based CSP, 3-D CSP, and wafer-level packaging. These chapters go into some detail on each of these CSP and are probably the most useful in the book. Each chapter typically includes a description of the package, materials used, performance including reliability, and applications. The final section includes two chapters addressing reliability issues including test methodology, failure mechanisms, and reliability testing for aerospace components. This book should be useful to anyone involved with making or using CSP as it provides thorough coverage of many types of CSP.

—K. F. Schoch, Jr.

Plastics Materials and Processes—A Concise Encyclopedia

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John Wiley & Sons
605 3rd Ave 4th Floor
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ISBN# 0-471-45603-9
Phone + 1 877 762 2974
Fax + 1 800 597 3299
http://www.wiley.com
974 pp.-$135.00 (Hardcover), 2003

Just as the title states, this is an encyclopedia on plastics and plastics technology. It is a source book for practical knowledge about the plastics industry. It contains three sections: an introduction, the encyclopedia section, and an appendix section. The introduction is brief, covering a description of thermoplastics and thermoset materials, reinforced plastics, films, and processing methods. This section orients the reader as to the types of plastics used today and the methods used to process them. The tables presented give the reader an excellent description of some of the uses and limitations of various processing methods and part design considerations, especially for someone unfamiliar with all of the commonly used industrial processing methods. The bulk of the book, the encyclopedia of terms, contains very brief but practical information on a wide variety of common polymers, plastics, additives, fillers, curing agents, processes, and industry terms—from A to Z. For example, information on polyvinyl chloride (PVC) de-

scribes both rigid and flexible forms, chemistry, structure, types of fillers, applications, suppliers, typical molding methods, other modified forms of PVC, general polymerization methods, and reasons for using the material for certain applications. Entries give the reader a good application-oriented view of the materials covered and a good understanding of many of the commonly used terms used in the plastics and molding industry.

The appendices are quite extensive, covering 15 sections for a total of 335 pages. They are loaded with very useful information ranging from plastic suppliers, elastomer properties, coatings, laminate properties, fabrication processes, materials properties, adhesives, properties of liquid resins, fillers, and a trade name directory, plus others.

This reference book would be very useful for those involved with plastics in any way but especially for designers using plastics.

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