

Electrical Properties of Polymers, by Evaristo Riande and Ricardo Diaz-Calleja. Marcel-Dekker, Inc., New York, NY, 2004, 630 pp., \$195.00, ISBN: 0-8247-5346-1

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With today's material technologies pushing the envelopes in terms of performance and cost, Evaristo Riande and Ricardo Diaz-Calleja have provided a timely work to address those intriguing aspects of materials, i.e., electrical properties. This book review focuses on certain chapters of interest based on past experience and interest areas. The authors have provided a very comprehensive work providing a suitable amount of theory to explain the concepts. Each chapter is followed by exercises and, when necessary, appendices to provide detail on derivations and other theoretical aspects.

In Chap. 2, the reader learns about dielectric friction. Under alternating electric fields, rotation of dipoles produce a time-varying electric field outside the cavity and energy is dissipated in the surroundings because of dielectric loss. This energy dissipation has the effect of slowing down rotations of dipoles. This

effect is dielectric friction. Chapter 8 discusses dielectric relaxation processes. The authors do a nice job of explaining the mechanics behind this phenomenon. This reviewer found the information useful since he could relate to his experience in using polymeric adhesives and the criticality of allowing processed parts a chance to relax in order to maximize material property benefits. Chapter 9 expands the discussion into relaxation of these materials in the glassy state. Chapter 12 does a good job of explaining piezoelectricity. The applications aspect of the chapter could have been enhanced by including sonar transducers and hydrophones as examples of the use of piezoelectric effect.

Chapter 14 addresses conductive (electrically) polymers. The authors do a commendable job of explaining the scientific basis of these materials. Information is also provided on the application of conductive polymers to semiconductors and rechargeable batteries.

In summary, Riande and Diaz-Calleja have provided a very good text. They do a good job of focusing on physical fundamentals to molecular behavior (e.g., dynamics and relaxations.) The content was presented in a format that greatly aids the reader in understanding the basic makeup of these materials. This book would greatly compliment, as well as enhance, a graduate course in advanced materials. It would also be a useful desk reference and is recommended for materials engineers.

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