to date for use in making better application design choices, it provides a wealth of practical information as well.

Dielectric Polymer Nanocomposites

J. K. Nelson, Editor
Springer
233 Spring Street
New York, NY 10013
Phone: (212) 460-1500
Fax: (212) 460-1575
http://www.springer.com
ISBN 978-1-4419-1590-0
378 pp. $169 (Hardcover) 2010

In electrical insulation, a nanocomposite is generally considered as a blend of a traditional dielectric material, frequently a polymer, with filler particles having nanometer dimensions. Because of the tremendous surface area to volume ratio of nanoparticles as compared with larger micron-sized particles, nanocomposites take on the properties of the interface between the polymer and the filler. This effectively creates a "new" material. These new materials can poses enhanced thermal, mechanical, magnetic, and electrical properties. Until recently, nanomaterial research has been primarily in electronic applications. Today, there are many papers and conferences publishing research on nanomaterials for improving the dielectric properties of insulators, including not only improvements in breakdown strength of insulators but work on increasing capacitor energy storage through increased permittivity, breakdown strength, and reduced variability through the use of nanomaterial fillers. This book is one of the first to address the role of nanocomposites in dielectric insulation.

Professor Keith Nelson has brought together many of the experts from around the globe who specialize in nanomaterials to present a book that illustrates the incredible potential for nanomaterials in electrical insulation. With each expert writing a chapter, Nelson has done an outstanding job in combining the best of practical topics with an industry focus with academics to gain a better understanding of not only how these materials function but how they are used in practical applications. A well-written background that touches on many areas such as compounding, chemistry, and the many dielectric property changes that can result from blending materials together will give the reader a good understanding of how nanomaterial fillers can alter many important dielectric properties including dielectric spectroscopy, space charge, dielectric absorption, and other interfacial effects. The remainder of the book is a combination of application, compounding, and theory. There is a chapter on processing nanocomposites that briefly touches on various processing methods and important factors such as particle shape, surface treatments, and the effect of contaminants on nanocomposite properties. Obviously, more in-depth studies would need to be investigated in journal references or through experimental research. Another chapter covers nano-sized clay dispersions in polymers and their ability to improve dielectric properties, especially in epoxy-based systems. Some examples cover how clay particles can increase the time-to-breakdown, improve thermal properties, and provide higher resistance to partial discharge erosion. Other chapters explore the theory and operating fundamentals of mechanical, electrical, thermal, and interfacial properties of these materials. These theories and mechanisms, however brief, still give the reader a good sense of the potential changes that could be obtained with nanomaterials. Although there are many experimental results presented, one typically will not find the exact material combinations they are looking for. Rather, this book can be used as a guide for continuing research on one's own. The up-to-date references at the end of each chapter allow one to continue researching topics for more details.

Over the past many years, new books on electrical insulation are few and far between, especially ones that can have a far-reaching effect of the future growth of electrical insulation. This book would be an excellent choice for researchers or academics working in or interested in learning more about nanocomposites and how they apply to electrical insulation, which may someday soon lead to new materials and applications.

Springer

http://www.springer.com/978-1-4419-1590-0

Dielectric Polymer Nanocomposites
Nelson, J.K. (Ed.)
2010, X, 368 p., Hardcover
ISBN: 978-1-4419-1590-0