and their classification schemes based on the dimensionality of the crystallites and further division based on their chemical composition. Chapter 3 discusses the synthesis, structure, and properties of the three widely used nanofillers—nanoclays, carbon nanotubes, and graphene—for immiscible polymer blends. Clear and concise pictures depicting the structure and formation mechanism as well as the spectroscopic and microscopic characterization of different nanofillers are included.

Chapter 4 describes the difference between melt blending and solvent casting techniques in preparing polymer composites. The conditions for miscibility, as well as theoretical aspects of phase diagrams of the blends, are also discussed. The authors evaluate the parameters affecting the morphology of final polymer nanocomposites and discuss the theory behind morphology evolution. Chapter 5 introduces processing techniques for the preparation of immiscible polymer blends and discusses the advantages of melt blending over solution blending, as well as the measures needed to maintain the integrity of nanoparticles during the melt blending process.

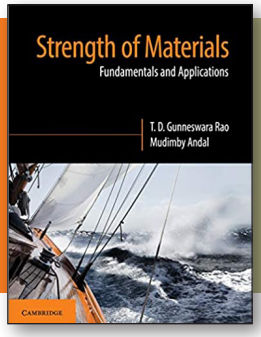
The localization or particle positioning in multiphase polymeric systems is important to tune the desired end-use application of the composite. Chapter 6 presents major migration mechanisms of particles inside an immiscible polymer blend. Chapter 7 discusses the contribution of processing conditions such as mixing sequence, mixing time, and shear force on the final localization of particles in immiscible polymer blends.

In an attempt to design a nanocomposite in line with the optimization of processing conditions, Chapter 8 discusses component-related (nanoparticle or the polymer) parameters such as the contact angle, shape, and size of the nanoparticles, and viscosity of the polymer pairs and their effect on migration.

Chapter 9 presents the migration-assisted localization of nanoparticles and the relationship between nanoparticle localization and electrical, mechanical, and rheological properties of immiscible polymer blends. Chapter 10 outlines the potential current and future applications of nanostructured immiscible polymer blend composites. Chapter 11 provides general conclusions and deep insights into future directions of immiscible polymer nanocomposites.

Overall, this book is well written and contains relevant information regarding the field of nanostructured immiscible polymer blends. Although it does not contain any problem sets, with up-to-date information and adequate bibliographical references, the book will be a valuable resource for undergraduate and graduate student researchers studying the field of polymers, as well as scientists and engineers from industry.

Reviewer: Jyothirmayee Aravind S.S.



Strength of Materials: Fundamentals and Applications

T.D. Gunneswara Rao and Mudimby Andal
Cambridge University Press, 2018
672 pages, $111.99
ISBN 9781108454285

This book is an excellent introduction to the field of mechanical properties of materials for students, engineers, researchers, and newcomers who wish to understand the fundamentals of materials design within different applications. The text introduces readers to different concepts related to the strength of materials, including stress, strain, elastic modulus, shear forces, bending stress, and bending moment. The book provides researchers with comprehensive knowledge supported by completed mathematical problems. Compelling illustrations of useful explanations of materials properties (particularly mechanical properties), as well as lists of adequate and up-to-date reference citations, are included.

The book is written from a combined perspective of mechanical engineering and materials engineering. Chapters 1 and 2 introduce the theory for stress, strain, and deformation and their relationship to the elastic constants in order to understand materials behavior. Chapters 3–5 provide an analysis of both shear-force and bending-moment diagrams, providing details regarding bending stress and flexural shear stresses of composite sections.

Chapters 6–8 discuss the various types of trusses using different methods, provide details on slope and deflections of beams with different loading conditions, and describe the analysis of the stresses induced in the cylinders. Chapters 9–11 examine the torsion of circular sections, provide information on maximum and minimal normal or shear stress, and explain the theory of open- and closed-coiled helical springs. Chapters 12 and 13 cover varying types of columns and their behaviors in-depth, with engaging sketches that illustrate estimation of stresses for combined actions. Chapters 14–17 offer readers an understanding of unsymmetrical bending and shear centers, providing details on the stresses induced in rotating discs and cylinders and stresses in bars with curvatures.

The authors provide useful discussion of solved problems to explain the mechanical properties of materials. This book would serve as an important addition to the libraries of those interested in mechanical properties of materials. It is recommended to all who are interested in the study of materials, particularly those entering the field, and is appropriate for someone with a metallurgy, materials, or mechanical engineering background.

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https://doi.org/10.1557/mrs.2020.322 Published online by Cambridge University Press