

# Preface

In many demanding applications such as automotive or aerospace, common engineering materials reaching their limits and new developments are required to fulfill the increasing demands on performance, characteristics, and functions. The properties of materials can be increased, for example, by combining different materials to achieve better properties than a single constituent or by shaping the material or constituents into a specific structure. Many of these new materials reveal a much more complex behavior than traditional engineering materials due to their advanced structure or composition. The purpose of this book is to cover one of the important physical characteristics, that is thermal properties, in detail from different points of view. This book aims to provide readers not only with a good understanding of the fundamentals but also with an awareness of recent advances in properties determination and applications of multiphase materials. The book contains 14 chapters written by experts in the relevant fields from academia and from major national laboratories/research institutes.

The first part of the book covers materials where two or more solid phases form the composite. The second part is related to porous and cellular materials where two or more solid phases form certain shapes of cells with an empty or air-filled space. Typical representatives of this group are foamed polymers or metals, which have a significant potential in multifunctional applications. The last part of the book covers problem where fluids in a solid structure fulfill technical functions – such as in the case of combustion – or significantly determining the overall characteristics of the material.

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