

Preface

The success of materials in technical applications as well as their safety during operation depends on robust characterization and/or prediction methods which provide reliable material properties. This becomes more and more important because engineering materials are used closer and closer to their limit to increase the performance of any machines and structures. To increase the engineering value of a material, components are designed under the consideration of their multi-physical properties and functions which requires a much more comprehensive investigation and characterization of these materials. The materials covered in this monograph range from metal-based groups such as lightweight alloys and advanced high-strength steels to modern titanium alloys. Furthermore, a wide range of polymers and composite materials (e.g., with micro- and nanoparticles or fibers) is covered. The properties that are covered range from classical mechanical characterization related, for example, to wear, creep, fatigue, and crack growth over specific surface properties to dielectric and electrochemical values. As in all fields of modern engineering, the process is many times accompanied by numerical simulation and optimization.

The 9th International Conference on Advanced Computational Engineering and Experimenting, ACE-X 2015, was held in Munich, Germany, from 29 June to 2 July, 2015, with a strong focus on computational based and supported engineering. This conference served as an excellent platform for the engineering community to meet with each other and to exchange the latest ideas. This volume contains 34 revised and extended research articles written by experienced researchers participating in the conference. Well-known experts present their research on metallic and polymer-based materials.

The organizers and editors wish to thank all the authors for their participation and cooperation which made this volume possible. Finally, we would like to thank the team of Springer Verlag, especially Dr. Christoph Baumann, for the excellent cooperation during the preparation of this volume.

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