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## Book Reviews

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Reviewed by Janez Grum

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- 1 Universities, Knowledge Transfer and Regional Development, Geography, Entrepreneurship and Policy,**  
**by: A. Varga**  
**Published 2009**  
**by Edward Elgar Publishing Limited, Glensanda House,**  
**Montpellier Parade, Cheltenham, Glos GL50 1UA, UK, 388pp**  
**ISBN: 978 1 84542 931 7**

The transfer of new, economically useful knowledge from universities to the regional economy has recently attracted the attention of academics, professionals and policy-makers alike. This book focuses on three issues at the centre of current research: the geography of academic knowledge transfers, the mechanisms of these transfers with regard to academic entrepreneurship and graduate mobility, and policy experience in university-based regional economic development.

The book contains the following chapters:

- *Part 1: Setting the scene: Analytical framework and knowledge inventory in theory, empirics and policy: What we know and what we do not know about the regional economic impacts of universities, Jaffe-Feldman-Varga: the search for knowledge spillovers, Detecting university–industry synergies: a comparison of two approaches in applied cluster analysis.*
- *Part 2: The geography of academic knowledge transfers: Recent developments: The role of higher education and university R&D for industrial R&D location, Internationalisation and regional embedding of scientific research in the Netherlands, Academic knowledge transfers and the structure of international research networks.*
- *Part 3: Knowledge transfer mechanisms: Academic entrepreneurship and graduate mobility: Academic entrepreneurs: critical issues and lessons for Europe, Firm formation and economic development: what drives academic spin-offs to success or failure? On the economics of university ranking lists: intuitive remarks on intuitive comparisons, Product differentiation or spatial monopoly? The market areas of Austrian universities in business education, higher education, graduate migration and regional dynamism in UK.*
- *Part 4: University-based regional development: The experience of lagging areas in Asia, Europe and North America: Barriers against the transfer of knowledge between universities and industry in newly industrialised countries: an analysis of university–industry linkages in Thailand, Knowledge-based local economic*

development for enhancing competitiveness in lagging areas of Europe: the case of the University of Szeged, The care and feeding of high-growth businesses in rural areas: the role of universities.

## **2 Rapid Prototyping, Principles and applications, Third edition**

**by: C.K. Chua, K.F. Leong, C.S. Lim**

**Published 2010**

**by World Scientific, New Jersey, London, Singapore,**

**Beijing, Shanghai, Hong Kong, Taipei, Chennai,**

**World Scientific Publishing Co. Pte. Ltd., 5 Toh Tuck Link,**

**Singapore 596224, 420pp,**

**ISBN-13: 978-981-277-897-0, ISBN-10: 981-277-897-7,**

**ISBN-13: 978-981-277-898-7 (pbk), ISBN-10: 981-277-898-5 (pbk)**

The focus on productivity has been one of the main concerns of industries worldwide since the early 1990s. To increase productivity, industries have attempted to apply more computerised automation in manufacturing. Amongst the latest technologies to have significant stride over the past two decades are the Rapid Prototyping Technologies, otherwise also known as Solid Freeform Fabrication, Desktop Manufacturing or Layer Manufacturing Technologies.

The revolutionary change in factory production techniques and management requires a direct involvement of computer-controlled systems in the entire production process. Every operation in this factory, from product design, to manufacturing, to assembly and product inspection, is monitored and controlled by computers. CAD-CAM or Computer-Aided Design and Manufacturing has emerged since the 1960s to support product design. Up to the mid-1980s, it has never been easy to derive a physical prototype model, despite the existence of computer numerical controlled (CNC) machine tools. Rapid Prototyping Technologies provide the bridge from product conceptualisation to product realisation in a reasonably fast manner, without the fuss of NC programming, jigs and fixtures.

The book is filled with information that even industry veterans will find useful. The chapters include detailed descriptions of the available additive processes, giving readers an overview of what is available commercially. The photographs, illustrations and tables make these chapters visually appealing and straightforward. References and problems at the end of each chapter help readers expand their understanding of the topics presented.

The chapter on data formats provides detail that new and advanced users alike will appreciate. It dives into related formats, such as IGES and SLC, but its in-depth coverage of the STL file format, including its limitations, problems and solutions, makes this chapter shine.

The book's sections on applications in manufacturing explain why and how organisations are putting the technology to work. Examples range from building flight-ready metal castings at Bell Helicopter to producing a human skull to aid in brain surgery at Keio University Hospital in Japan.

The depth and breadth presented in this book make it clear that the authors have a strong understanding of additive fabrication technologies and applications.

The material in this book has been used for more than 40 times for professional courses conducted for both academia and industry audiences since 1991. To be used more effectively for graduate or final-year undergraduate students in Mechanical, Aerospace, Production or Manufacturing Engineering, problems have been included in this textbook. For university professors and other tertiary-level lecturers, the subject RP can be combined easily with other topics such as CAD, CAM, Machine Tool Technologies and Industrial Design.

### **3 A Pragmatic Introduction to the Finite Elements Method for Thermal and Stress Analysis with the Matlab Toolkit SOFEA**

**by: P. Krysl**

**Published 2006**

**by World Scientific, New Jersey, London, Singapore,  
Beijing, Shanghai, Hong Kong, Taipei, Chennai, 5 Thuck Link,  
Singapore 596224, 278pp,**

**ISBN: 981-256-876-X, ISBN: 981-270-411-6 (pbk)**

This book focuses on the two continuum mechanics models that are commonly encountered by mechanical, aerospace, civil, chemical, bio and manufacturing engineering students: heat conduction in solids and stress analysis. Its main purpose is to provide the reader with an insight into the working of the continuum models and the finite element method by supplying information sufficient to guide intelligent modelling, and in particular a proper treatment of the boundary conditions is given much attention. The basis for the formulation of the finite element models is the Galerkin method, as a special case of the method of weighted residuals. This is a very general approach, more broadly applicable than techniques based on variational principles, and it was chosen with the hope of serving the students well throughout their academic careers, including graduate-level courses on numerical solutions of non-linear initial boundary value problems.

This book is a precipitate of lectures given over the years to Structural Engineering majors in their senior year at the University of California, San Diego. There are two aspects to the book: the first and foremost is a gradual and rational construction of the framework of the finite element models; the second, for the most part parallel, but sometimes subordinate, is the programming of the discussed algorithms in a sound software-engineering methodology. The first aspect to the book is comfortably covered in an undergraduate course in one quarter, but the implementation is only touched upon here and there. One semester would allow ample time for full in-depth treatment of both aspects. On the other hand, presenting this book to graduate students who have been exposed to finite elements before would allow for the entire book to be studied thoroughly in one quarter, with equal coverage of both aspects.

The students should have a working knowledge of multivariable calculus, differential equations and linear algebra. The more advanced mathematical tools are reviewed when and where needed. Familiarity with the basics of solid mechanics will be helpful, but since no important steps are being skipped in the formulations of the models, the book is really practically self-contained in this respect.

#### **4 How to Succeed as a Scientist; From Post to Professor**

**by: B.J. Gabrys, J.A. Langdale**

**Published 2012**

**by Cambridge University Press, The Edinburgh Building,  
Cambridge CB2 8 RU, UK, 221pp**

**ISBN: 978-0-521-76586-2 Hardback,**

**ISBN: 978-0-521-18683-4 Paperback**

This unique, practical guide for postdoctoral researchers and senior graduate students explains, stage by stage, how to gain the necessary research tools and working skills to build a career in academia and beyond. The book is based on a series of successful training workshops run by the authors, and it is enriched by their extensive interdisciplinary experience as working scientists.

- discusses the tools needed to become an independent researcher, from writing papers and grant applications, to applying for jobs and research fellowships
- introduces skills required as an academic, including managing and interacting with others, designing a taught course and giving a good lecture
- concludes with a section on managing your career, explaining how to handle stress, approach new challenges and understand the higher education system.

Packed with helpful features encouraging readers to apply the theory to their individual situation, the book is also illustrated throughout with real-world case studies that enable readers to learn from the experiences of others. It is a vital handbook for all those wanting to pursue a successful academic career in the sciences.

#### **5 Research Methods for Science**

**by: M.P. Marder**

**Published 2011**

**by Cambridge University Press, The Edinburgh Building,  
Cambridge CB2 8 RU, UK, 227pp**

**ISBN: 978-0-521-14584-8 Paperback**

As a unique introduction to the design analysis and presentation of scientific projects, this is an essential textbook for undergraduates in science and mathematics.

This text gives an overview of the main methods used in scientific research, including hypothesis testing, the measurement of functional relationships and observational research. It describes important features of experimental design, such as the control of errors, instrument calibration, data analysis, laboratory safety and the treatment of human subjects. Important concepts in statistics are discussed, focusing on standard error, the meaning of  $p$ -values and the use of elementary statistical tests. The textbook introduces some of the main ideas in mathematical modelling, including order-of-magnitude analysis, function fitting, Fourier transforms, recursion relations and difference approximations to differential equations. It also provides guidelines on accessing scientific literature and preparing scientific papers and presentations.

This book accompanies a one-semester undergraduate introduction to scientific research. The course was first developed at The University of Texas at Austin for students preparing to become science and mathematics teachers, and has since grown to include a broad range of undergraduates who want an introduction to research. The heart of the course is a set of scientific enquiries that each student develops indecently. In years of teaching the course, the instructors have heard many questions that students naturally ask as they gather data, develop models and interpret them. This book contains answer to those most common questions.

**6 Light Metals 2013, Proceedings of the Symposia Sponsored by the TMS Aluminium Committee at the TMS 2013 Annual Meeting & Exhibition, San Antonio, Texas, USA March 3–7 2013, by: Barry A. Sadler, The Minerals, Metals & Materials Society Published 2013 by WILEY, John Wiley & Sons, Inc. Hoboken, New Jersey, 111 River Street, Hoboken, NJ 07030-5774, USA, 1377pp ISBN: 978-1-11860-572-1, ISBN: 1096-9586**

The impurities contained in the raw materials used by the aluminium industry pose challenges that must be managed from various perspectives. These include: product quality, costs and impact upon the work environment and areas that surround smelters. As the industry countries to grow, impurities, and changes in impurities, will take on greater meaning for process control, equipment design and selection, metal products, and environmental, health and safety.

Some of these potential threats from impurities will no doubt evolve gradually and will be dealt with by changes in processing, technology, or practices. It is apparent that as needs present themselves that technology will be developed to meet the emerging challenges or to forestall the threats.

Currently, only limited information is available in the public domain on impurities that affect the aluminium industry. It is not a topic that has been driven by the necessity to sustain operations or to service commonly produced metal products. Forums such as Plenary Sessions and annual meetings of TMS and contributions to the literature will begin to close this gap.

The book contains the following session presentations:

- 2013 aluminium keynote: impurities in the aluminium supply chain
- alumina and bauxite: digestion, clarification, red mud, precipitation and calcination, impurities, low grade alumina sources.
- aluminium alloys fabrication, characterisation and application: development and application, corrosion resistance performance, casting and solidification, thermal mechanical processing, solutioning and aging, emerging technology, general poster session
- aluminium processing: aluminium processing I, aluminium processing II

- aluminium reduction technology: cell design and performance, fundamentals: modelling, potline operation I: smelter operations, fundamentals: chemistry, cell operations and process control, environment I, potline operation II equipment, environment II PFCs, cell fundamentals, phenomena and alternatives I (2010)
- cast shop for aluminium production: aluminium cast shop I, aluminium cast shop II, aluminium cast shop III and aluminium cast shop IV.
- electrode technology for aluminium production: anode raw materials, paste plant operations, bake furnace design and operation, anode quality and performance, cathode materials and wear, inert anodes, cell materials and alternative processes, CBF environmental and anode electrical connections.

**7 Friction Stir Welding and Processing VII**  
**Proceedings of a Symposium Sponsored by the Shaping and Forming**  
**Committee of the Materials Processing & Manufacturing Division**  
**of TMS (The Materials, Metals & Materials Society)**  
**Holding during TMS 2013 Annual Meeting & Exhibition, San Antonio,**  
**Texas, USA, March 3–7 2013**  
**by: R. Mishra, M.W. Mahoney, Y. Sato, Y. Hovanski, R. Verma**  
**The Minerals, Metals & Materials Society**  
**Published 2013**  
**by WILEY, John Wiley & Sons, Inc., Hoboken, New Jersey,**  
**111 River Street, Hoboken, NJ 07030-5774, USA, 362pp**  
**ISBN: 978-1-11860-578-3**

The friction stir welding tool is a crucial part that is essentially responsible for frictional heating and plastic dissipation in weld materials. The flow of weld materials around the tool is highly influenced by the geometric shape and features of the tool pin during FSN, which eventually affects the mechanical and microstructural properties to obtain sound welded material. The local plastic deformation and mixing of the workpiece along the weld seam is primarily due to the pin. Therefore, to achieve an efficient friction stir process, it is important to design the tool pin with proper geometric shape and features. A good process results in defect-free joints with superior mechanical and microstructural properties as well as lessens in-plane forces on the tool. Furthermore, minimisation of the in-plane reaction force is an important consideration for tool life and production of long welds. Within a process window (a set of rpm and weld traverse speed), the design of tool geometries and features may vary depending on the weld material flow stress behaviour (depend on the alloy type and alloy properties) and dimensions. Hence, the optimum tool design may be very specific for a given situation and not readily obtained by perusing the available literature.

The book contains the following chapters:

- friction stir processing
- friction stir welding: high temperature materials – I
- friction stir welding: high temperature materials – II

- friction stir welding: light materials – I
- friction stir welding: light materials – II
- friction stir welding and processing: modelling and controls

## **8 Nanobiomaterials Development and Applications**

**by: D. Kee Yi, G. Papaefthymiou**

**Published 2013**

**by CRC Press, Taylor & Francis Group, 6000 Broken Sound Parkway  
NW, Suite 300, Boca Raton, FL 33487-2742, USA, a productivity press  
book, 448pp**

**ISBN: 987-1-4398-7641-1 (hardcover)**

The Advances in Materials Science and Engineering series by CRC Press/Taylor & Francis Group is designed to help meet new and exciting challenges in materials science and engineering discipline.

Nanobiotechnology is a recently activated term describing the convergence of molecular biology and engineering. The combination of these disciplines over the last decade has realised a new class of smart devices or systems for biological and chemical analysis defined by improved specificity and sensitivity as well as higher rates of molecular recognition compared with previous solutions. Advances have been made in nanobiochip materials, biomimetic materials, nanocomposite materials, interface biomaterials, photolytic materials, nanomotors, nanobiosensors and drug delivery systems, with enormous prospect in industrial, defence and medical applications of great societal impact. Such technological advances are the direct outcome of the continuous exchange of ideas, which is taking place across the border between the biological and physical sciences in many areas of nanoscience. This interdisciplinary exchange is based on the premise that nanotechnology offers biology new tools, whereas biology offers nanotechnology new types of functional materials.

The book contains the following chapters:

*Part I:* Nanomaterials in nanobiotechnologies: preparation, characterisation and applications

- bio-inspired magnetic nanoparticles
- nanoparticles for bioimaging
- biomedical applications of dendrimer porphyrin of phthalocyanine
- polymeric nanoparticles in cancer therapy
- carbon nanotube bioconjugates
- magnetically induced hyperthermia for biomedical applications.

*Part II:* Soft block nanobuilding: new preparation routes of soft nanomaterials using biomolecules

- engineered biomolecules as nanomaterials.

*Part III: Nanomaterials and bio-MEMS: nano- and microscale hybridisation of metals and applications*

- microfluidic-based polymers scaffold design for tissue engineering
- fabrication of mobile hybrid microswimmers using micro/nanoparticles and bacterial flagella.

*Part IV: Nanotoxicity studies and applications in eco-biosystems*

- environmental applications of nanomaterials
- cytotoxicity of biosynthesised nanomaterials.

## **9 Biological and Biomedical Coatings Handbook Applications**

**by: S. Zhang**

**Published 2011**

**by CRC Press, Taylor & Francis Group, 6000 Broken**

**Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742, USA,**

**a productivity press book, 505pp**

**ISBN: 987-1-4398-4996-5 (Hardback)**

The *Advances in Materials Science and Engineering* series by CRC Press/Taylor & Francis Group is designed to help meet new and exciting challenges in materials science and engineering discipline. The books and monographs in the series are based on cutting-edge research and development, and thus are up-to-date with new discoveries, new understanding and new insights in all aspects of materials development, including processing and characterisation and applications in metallurgy, bulk or surface engineering, interfaces, thin films, coatings and composites, just to name a few.

The series aims at delivering an authoritative information source to readers in academia, research institutes and industry. The Publisher and its Series Editor are fully aware of the importance of Materials Science and Engineering as the foundation for many other disciplines of knowledge. As such, the team is committed to making this series the most comprehensive and accurate literary source to serve the whole materials world and the associated fields.

An exploration of the fundamental elements of biological and biomedical coatings, the first volume, *Processing and Characterisation*, addresses:

- synthesis, fabrication and characterisation of nanocoatings
- the sol-gel method and electrophoretic
- thermal and plasma spraying
- hydroxyapatite and organically modified coating
- bioceramics and bioactive glass-based coatings
- hydrothermal crystallisation on self-healing effects
- physical and chemical vapour deposition
- layered assembled polyelectrolyte film.

Whit chapters authored by world experts at the forefront of research in their respective areas, this timely set provides searing insights and practical information to explore a subject that is fundamental to the success of biotechnological pursuits.

The book contains the following chapters:

- bone-like mineral and organically modified bone-like mineral coatings
- synthesis and characterisation of hydroxyapatite nanocoatings by sol-gel method for clinical applications
- hydroxyapatite and other biomedical coatings by electrophoretic deposition
- thermal sprayed bioceramic coatings: nanostructured hydroxyapatite (HA) and HA-based composites
- nanostructured titania coatings for biological applications: fabrication and characterisation
- hydrothermal crystallisation with microstructural self-healing effect on mechanical and failure behaviours of plasma sprayed hydroxyapatite coatings
- bioceramic coatings on titanium by physical and chemical vapour
- coating of materials surface with layer-by-layer assembled polyelectrolyte film
- bioactive glass-based coatings and modified surfaces: strategies for the manufacture, testing and clinical applications for regenerative medicine.

## **10 Biological and Biomedical Coatings Handbook Processing and Characterisation**

**by: S. Zhang**

**Published 2011**

**by CRC Press, Taylor & Francis Group, 6000 Broken**

**Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742,**

**USA, a productivity press book, 441pp**

**ISBN: 987-1-4398-4995-8 (Hardback)**

The *Advances in Materials Science and Engineering* series by CRC Press/Taylor & Francis Group is designed to help meet new and exciting challenges in materials science and engineering discipline. The books and monographs in the series are based on cutting-edge research and development, and thus are up-to-date with new discoveries, new understanding, and new insights vain all aspects of materials development, including processing and characterisation and applications in metallurgy, bulk or surface engineering, interfaces, thin films, coatings and composites, just to name a few.

Building on the theoretical and methodical fundamentals of coating as presented in the first volume, Application covers:

- biological/biomedical implants and other applications of carbon-based materials
- control of drug release from coating
- microfluidic biosensing/bioactive coatings and applications

- surfaces and coatings of orthopaedic, dental and other implants
- sol-gel-derived hydroxyapatite coatings on metallic implants
- impedance spectroscopy.

With chapters authored by world experts at the forefront of research in their respective areas, this timely set provides searing insights and practical information to explore a subject that is fundamental to the success of biotechnological pursuits.

- sol-gel derived hydroxyapatite coatings on metallic implants: characterisation, in vitro and in vivo analysis
- amorphous carbon coatings for biological application
- biomedical application of carbon-based materials
- impedance spectroscopy of carbon-based materials for biological application
- control of drug release from coatings: theories and methodologies
- release-controlled coatings
- orthopaedic and dental implants surfaces and coatings
- piezoelectric zinc oxide and aluminium nitride films for microfluidic and biosensing application
- bioactive coating for implanted devices.