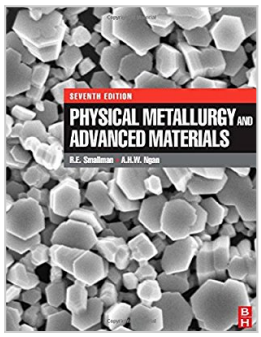

Physical Metallurgy and Advanced Materials, Seventh Edition

By R. E. Smallman PhD, A.H.W. Ngan PhD

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Physical Metallurgy and Advanced Materials is the latest edition of the classic book previously published as *Modern Physical Metallurgy and Materials Engineering*. Fully revised and expanded, this new edition is developed from its predecessor by including detailed coverage of the latest topics in metallurgy and material science. It emphasizes the science, production and applications of engineering materials and is suitable for all post-introductory materials science courses.

This book provides coverage of new materials characterization techniques, including scanning tunneling microscopy (STM), atomic force microscopy (AFM), and nanoindentation. It also boasts an updated coverage of sports materials, biomaterials and nanomaterials. Other topics range from atoms and atomic arrangements to phase equilibria and structure; crystal defects; characterization and analysis of materials; and physical and mechanical properties of materials. The chapters also examine the properties of materials such as advanced alloys, ceramics, glass, polymers, plastics, and composites. The text is easy to navigate with contents split into logical groupings: fundamentals, metals and alloys, nonmetals, processing and applications. It includes detailed worked examples with real-world applications, along with a rich pedagogy comprised of extensive homework exercises, lecture slides and full online solutions manual (coming). Each chapter ends with a set of questions to enable readers to apply the scientific concepts presented, as well as to emphasize important material properties.

Physical Metallurgy and Advanced Materials is intended for senior undergraduates and graduate students taking courses in metallurgy, materials science, physical metallurgy, mechanical engineering, biomedical engineering, physics, manufacturing engineering and related courses.

- Renowned coverage of metals and alloys, plus other materials classes including ceramics and polymers.
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Editorial Review

From the Back Cover
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Key features:
• Renowned coverage of metals and alloys, plus other materials classes including ceramics and polymers.
• Easy to navigate with contents split into logical groupings: fundamentals, metals and alloys, non-metals, processing and applications
• Detailed worked examples and maintains reference throughout to processing materials for real world applications
• Covers materials characterization, surface properties, materials simulation, bio materials and nano-scale materials
• Rich pedagogy includes extensive homework exercise sets

About the Author
After gaining his PhD in 1953, Professor Smallman spent five years at the Atomic Energy Research Establishment at Harwell before returning to the University of Birmingham, where he became Professor of Physical Metallurgy in 1964 and Feeney Professor and Head of the Department of Physical Metallurgy and Science of Materials in 1969. He subsequently became Head of the amalgamated Department of Metallurgy and Materials (1981), Dean of the Faculty of Science and Engineering, and the first Dean of the newly created Engineering Faculty in 1985. For five years he wasVice-Principal of the University (1987-92).

He has held visiting professorship appointments at the University of Stanford, Berkeley, Pennsylvania (USA), New SouthWales (Australia), Hong Kong and Cape Town, and has received Honorary Doctorates from the University of Novi Sad (Yugoslavia), University ofWales and Cranfield University.

His research work has been recognized by the award of the Sir George Beilby Gold Medal of the Royal Institute of Chemistry and Institute of Metals (1969), the Rosenhain Medal of the Institute of Metals for contributions to Physical Metallurgy (1972), the Platinum Medal, the premier medal of

the Institute of Materials (1989), and the Acta Materialia Gold Medal (2004).

Hewas elected a Fellowof the Royal Society (1986), a Fellowof the RoyalAcademy of Engineering (1990), a Foreign Associate of the United States National Academy of Engineering (2005), and appointed a Commander of the British Empire (CBE) in 1992. A former Council Member of the Science and Engineering Research Council, he has been Vice-President of the Institute of Materials and President of the Federated European Materials Societies. Since retirement he has been academic consultant for a number of institutions both in the UK and overseas.

Professor Ngan obtained his PhD on electron microscopy of intermetallics in 1992 at the University of Birmingham, under the supervision of Professor Ray Smallman and Professor Ian Jones. He then carried out postdoctoral research at Oxford University on materials simulations under the supervision of Professor David Pettifor. In 1993, he returned to the University of Hong Kong as a Lecturer in Materials Science and Solid Mechanics, at the Department of Mechanical Engineering. In 2003, he became Senior Lecturer and in 2006 Professor. His research interests include dislocation theory, electron microscopy of materials and, more recently, nanomechanics. He has published over 120 refereed papers, mostly in international journals. He received a number of awards, including the Williamson Prize (for being the top Engineering student in his undergraduate studies at the University of Hong Kong), Thomas Turner Research Prize (for the quality of his PhD thesis at the University of Birmingham), Outstanding Young Researcher Award at the University of Hong Kong, and in 2007 was awarded the Rosenhain Medal of the Institute of Materials, Minerals and Mining. He also held visiting professorship appointments at Nanjing University and the Central Iron and Steel Research Institute in Beijing, and in 2003, he was also awarded the Universitas 21 Fellowship to visit the University of Auckland. He is active in conference organization and journal editorial work.

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