

# Preface

This volume of Diffusion Foundations entitled Diffusion Phenomena in Engineering Materials captures an important cross section of the contemporary scene of diffusion in solids, ranging from the fundamental science of diffusion through to the application of diffusion concepts in technology. The chapters are written by well-acknowledged experts in their respective areas. In the first chapter, Professor Dayananda provides an in depth overview of some of the important findings from the vast literature on multicomponent diffusion in alloys. In Chapter 2, Professors Belova and Murch and co-workers describe a new solution to the important problem of accurately estimating a tracer diffusivity in a binary alloy, given the other tracer diffusivity, the interdiffusivity and thermodynamic factor. This is followed by Chapter 3 where Professor Lidiard gives a penetrating perspective on the state of knowledge about the Soret effect and thermodiffusion (thermotransport) in solids. In Chapter 4, Professor Kozlowski and colleagues describe important new findings about the critical dimensions of ferromagnetic nanoparticles of iron. This is followed by Chapter 5 where Professor Çimenoglu and co-workers present an in depth overview of surface hardening of titanium and its alloys by way of diffusion of the interstitial atoms of oxygen, nitrogen and boron. In Chapter 6 Professor Morton-Blake describes fascinating new molecular dynamics simulations of sodium and chloride ions in a synthetic ion channel in a membrane. Finally, in Chapter 7, Professor Seetharaman and colleagues describe the important role of diffusion phenomena in process metallurgy. We wish to thank the authors for their prompt contributions and the reviewers for their input.

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