Foreword

The depletion of the first edition print run and an enormous increase in published research on high-temperature corrosion have combined to make a second edition of this book desirable. Recent work on mass transport in alumina and, more generally, on oxide grain boundary diffusion has contributed improved clarity to our understanding of how protective alumina and chromia scales behave. Similarly, new investigations into water vapour effects on scaling processes have expanded and refined our knowledge, although a simple, coherent picture remains elusive. These contributions, and several others, have been drawn upon in updating the original text.

Two new topics have been added, reflecting the large body of published research now available and the technological developments which drove that work. Chapter 10 treats corrosion by carbon dioxide, an important issue if CO_2 is to be captured from combustion gas streams. In addition, the thermal properties of carbon dioxide, along with its pressure-volume-temperature characteristics, make it attractive as a heat transfer and working fluid. For these reasons, it is a candidate for use in nuclear reactors and concentrated solar thermal power generation. Unfortunately, it is also corrosive to a variety of alloys.

A new Chapter 12, *Corrosion in Complex Environments*, is concerned with the corrosion phenomena arising from the presence of ionic melts and volatilising halides. Interest in these topics has arisen out of the much increased use of both biomass and municipal waste as fuels for thermal power generation. The resulting flue gases and deposits can be remarkably corrosive, and boiler operating temperatures are strictly limited as a result.

As in the first edition, I have tried to acknowledge important contributions to our understanding made by many researchers, and I apologise for any omissions. The second edition has benefited from colleagues around the world who have offered hospitality and/or generously gave expert commentary: Brian Gleeson (University of Pittsburgh), Daniel Monceau (INPT-CIRIMAT, Toulouse), Bruce Pint (Oak Ridge National Laboratory), Joe Quadakkers (Forschungszentrum, Jülich), Michael Schutze (Dechema, Frankfurt) and Jim Smialek (NASA, Lewis). Rectifying an important omission from the first edition, I thank my wife and family for their support and remarkable forbearance.

David J. Young
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