

# Preface

The research on metals in their liquid state has been underestimated for a long time and the specific literature was scarce compared to those regarding solid metals. There are several reasons for that. In general liquid metals are not commercial articles by themselves but represent an intermediate step towards industrial products. In addition, except some rare cases, it is a challenging task to find direct relationships between the characteristics and properties of alloys in the solid state and in the liquid one. Furthermore, the study of metallic melts encounters specific difficulties which hinder the knowledge of their structure and physical properties. The determination of diffusion coefficients in the liquid represents a typical example. Such kind of measurement is dramatically affected by convective-, Marangoni- and other liquid motions and requires not only conditions of reduced gravity but also suppression of g-jittering, namely the disturbance coming from the movement of small masses (like persons) near the instruments. Last but not least, some experimental techniques commonly used for other liquids are of no use for metallic melts, for instance optical techniques owing to the opacity of liquid metals to visible light.

In the last twenty years the situation has progressively changed and the matter has emerged as a fundamental area of investigation for physicists, metallurgists and materials scientists with consequent achievement of relevant results both on basic and applicative aspects.

Today the description and the characterisation of molten metals and alloys is a wide and interdisciplinary topic and involves different approaches, from physics to technology, from processing to modelling.

The special issue presents work by investigators of great experience who present the results of their researches covering different aspects of the matter. The book is structured in review and research papers and offers the state-of-the-art information on physics, technological properties, processing and modelling of physical and technological behaviour of liquid metals and alloys.

Hoping that the matter of this special issue could be of interest for many researchers in the field of Materials Science, Metallurgy and Condensed States Physics, the editors would like to express their gratitude to all the authors who gave their contribution.

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