

Preface

The symposium Materials Processing Fundamentals is annually hosted at The Minerals, Metals & Materials Society (TMS) annual meeting, as the flagship symposium of the Process Technology and Modeling Committee. It is a unique opportunity for interdisciplinary presentations and discussions about processing across materials, across state of matter, and as always at TMS, across continents. The presentations and papers have a common theme: the quest for modeling—either numerical or physical—or sensing as applied to production or synthesis processes. The materials covered include ferrous and non-ferrous elements, and the processes range from mining unit operations to joining and surface finishing of materials. Indeed, recognizing that modern processes involve multi physics, the symposium and its proceedings allow novel or existing practitioners to learn the methods and outcome of other fields’ modeling practices, often enabling the development of practical solutions to common problems. Clearly, modeling of basic thermodynamic and physical properties play a key role, along with computer fluid dynamics and multiphase transport and interface modeling. Contributions in this opus include applications such as steel secondary metallurgy, with developments for specific unit operations (continuous casting, ladle refining, slabs cooling, etc). Gaseous or molten state processes are studied, for example chemical properties of ferrous and non-ferrous systems (silicates, calcium chloride, sodium hydroxide, sulfides), of molten zirconium or gaseous gallium. Two models of mechanical and electrochemical processes are included, completing a broad view of the field and practices of modeling in materials processing. The engagement of the TMS members with the committee to chair sessions, review manuscripts, and help TMS to reflect the existing practices, makes such a symposium and its proceedings possible. The editor and its co-editors therefore thank warmly those volunteers along with the TMS staff, encompassing Patricia Warren and Matt Baker, for there exceptional support to allow the present opus to exist.

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