Foreword

Special Issue: Revisiting Materials Challenges from the Perspective of Energy Applications

Materials challenges remain to be the core issues for their applications in the energy sector. To maintain an energetically economical and environmentally sustainable global supply of materials, it is imperative to guide their synthesis with scientific insights, characterize them with better understanding of behaviors and properties, innovate ways of measurement and evaluation, and develop processes that are more flexible in terms of raw materials and reduction sources. This necessitates not only the development of new processes such as those based upon the use of bio-mass for reduction, but also modifications of existing ones like implementing direct hot-roll charging, increased use of high residual scraps, etc.

Metallurgical and Materials Transactions E possesses a unique position to embrace these materials challenges viewed from various energy applications. In this regard, the journal is charged with the obligation of seeking front-running scientists to share research frontiers reflecting recent advances on pertinent aspects.

This special issue collects papers that focus the latest research highlights on a wide spectrum of topics, including fundamental understanding on heat recovery and recycling for the disposal of high temperature slags, new findings on oxide coarsening mechanisms for Fe-Y alloy, measurement and simulation advancement of thermal conductivity of neutron absorber materials, renewed understanding on electrochemical reduction of SiO_2 in CaCl_2 molten salt, newly designed fluorine-free mold flux development for continuous casting of steels, alternatively utilizing spent pot-lining as fuel for metallurgical furnaces, steel composite development for automotive application, and re-assessment of the Mn-O system, as well as renewed thermodynamic examination of physicochemical properties of the MgCl_2 system geared toward accelerated Zirconium production. Moreover, energy intensity evaluation models and raw materials selection criteria have been proposed with state-of-the-art insights.

I thank all the authors, reviewers, and persons who maneuvered strenuously to conceive ideas, draft manuscripts, and review submissions on a relatively short notice, but with quick turnaround. Acknowledgment also goes to the “Global Talent Recruitment Program” (1000 Plan) for the financial support, which allows me to dedicate a significant amount of time to convene, organize, and coordinate with this group of leading scientists to the success of this special issue.

Respectfully submitted to *Metallurgical and Materials Transactions E*.

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