Foreword: Symposium on Austenite Formation and Decomposition IV

The technological importance of ferrous alloys rests to a large extent on their relatively low cost and on their ability to achieve desirable strength-ductility combinations. The attainment of superior properties depends to a large degree on the phase transformations to and from austenite that occur during processing. From a scientific standpoint, ferrous alloys have been and continue to be benchmark materials from which solid-solid phase transformations understanding, broadly considered, was first formulated and developed. Since pioneering studies began in the 1880s, significant advances in this understanding have been made in view of developments such as the first Fe-C phase diagram (1900), X-ray diffraction (1920s), T-T-T diagrams (1930s), classical nucleation-and-growth theory (1940s), theories of martensite (1950s), and electron microscopy (1950s).

By 1960, ferrous phase transformations understanding had matured enough to prompt the first conference in this series, resulting in a number of wide-ranging, landmark treatments of austenite decomposition. Subsequent symposia have included experimental advances and have addressed topics of interest to steelmakers and end users. The proceedings of the predecessor symposia are summarized as follows:

- I. *Decomposition of Austenite by Diffusional Processes*, V.F. Zackay and H.I. Aaronson, eds. Interscience (New York, NY), 1962.
- II. *Phase Transformations in Ferrous Alloys*, A.R. Marder and J.I. Goldstein, eds. TMS-AIME (Warrendale, PA), 1984.
- III. *Austenite Formation and Decomposition*, E.B. Damm and M.J. Merwin, eds. TMS and ISS (Warrendale, PA), 2003.

The present symposium, nicknamed *AF&D IV*, was intended to continue in this spirit. Major themes engaged in *AF&D IV* included multiphase steels, with particular regard for austenite stability; the use of atom probe tomography and electron backscatter diffraction; fundamentals of alloy element effects; tailored design of steel chemistry and thermomechanical processing routes; phase transformations during rapid heating; and computational approaches to thermodynamics, kinetics, and property evolution. Many of these developments have been in circulation only in the past decade or so, indicating the continued vitality of the community in applying new methods, as well as in devising imaginative new microstructure and processing concepts, to advance the science and engineering of ferrous alloys.

This symposium was held 17–21 October 2010 as part of the Materials Science & Technology 2010 (MS&T'10) Conference and Exhibition held in Houston, TX. A total of 43 talks were delivered over 7 sessions spanning 3.5 days, with a significant international presence. We thank all the speakers, session chairs, and the many participants that gave this symposium strong attendance and vitality through to the final day. Special thanks are extended for the support provided by the Phase Transformations Committee of ASM and TMS, the Metallurgy – Processing, Products, and Applications Technology Committee of AIST, and the TMS and AIST staff. We gratefully acknowledge the financial support from a National Science Foundation grant, DMR-1041721, which offset the conference attendance expenses of student participants and young members of the ferrous phase transformations community.

Metallurgical and Materials Transactions A was selected as the publishing venue, and a total of 15 manuscripts, having undergone the standard peer-review process, have been accepted for publication. We appreciate the work of those who served as peer reviewers and of Dora Moscatello for assistance in preparing this special issue.

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