Preface to the Special Issue on “Common Bases for Hydrogen Embrittlement Studies”

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Hydrogen embrittlement, a serious problem of structural materials, is again increasing its importance with recent energy-saving technologies such as high-strengthening of materials and hydrogen-energy systems. While hydrogen embrittlement has long history of diverse studies, the establishment of common bases in methodologies and fundamental concepts is still a crucial and urgent matter. Substantial studies have been conducted recently in Japan under national projects and group studies by ISIJ for the assessment and revealing the mechanism of hydrogen embrittlement.

The projects have also stimulated extensive studies and the present special issue collects both original and review papers that serve for common procedures and understanding of hydrogen embrittlement of mostly structural materials such as high-strength steels, stainless steels and other alloys. The topics cover

1. Hydrogen analysis and characterization
2. Hydrogen effects on mechanical properties
3. Hydrogen entry and uptake
4. Evaluation of hydrogen embrittlement

Novel findings and useful information are included in these topics for the precision of hydrogen analysis, comparison of hydrogen-charging methods, hydrogen distribution and states in materials, detection of lattice defects, degradation behaviors, evaluation and mechanism of hydrogen embrittlement.

This special issue is expected to be useful for many researchers to update their understanding of recent advances and to design further studies on hydrogen embrittlement of structural materials.

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