

FOREWORD

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The changes in the environment surrounding electric power in recent years have been remarkable. Accompanying economic development, global demand for electric power increased by approximately 40% in the 10 years from 2003 to 2013. However, further progress in expansion of the power supply infrastructure is conceivable, as even today in the 21st century, roughly 1 billion people live without access to electric power. On the other hand, as a response to environmental problems, high efficiency programs for electrical equipment are being promoted in countries around the world. Japan introduced the Top Runner Program in 1999, and various energy efficiency regulations have been implemented for electrical equipment such as air conditioners, refrigerators, transformers, and industrial motors, among others. Moreover, the response to environmental problems has also accelerated diversified and more advanced methods of power supply and use, for example, solar, wind and other forms of renewable energy, hybrid/electric vehicles and large-scale direct current power transmission.

In response to these remarkable changes, we at JFE Steel have been aiming to produce technical innovations by continuing to challenge changes and deliver attractive electrical steel sheets to our customers.

Electrical steel sheets are basic materials which are used in the iron core materials of electrical equipment, and their properties have a large impact on the performance of that equipment. Therefore, we vigorously promoted improved performance and higher functionality in electrical steel sheets and grappled with the development of the following new products: (1) In grain-oriented electrical steel sheets, development of low iron loss domain-refined grain-oriented electrical steel sheets which respond to transformer efficiency regulations or enable further improvement in efficiency, (2) in non-oriented electrical steel sheets, development of high magnetic flux density/low iron loss non-oriented electrical steel sheets which are suitable for use in the main motors of hybrid cars and electric vehicles, and (3) in high Si steel sheets and Super Core™, development of high magnetic flux density electrical steel sheets with low iron loss at high frequency, which are advantageous for

achieving high efficiency/downsizing of reactors and other high frequency electrical devices. Together with the development of these new products, we are also working to expand use, evaluation and analysis technologies for electrical steel sheets with the aim of utilizing the properties of electrical steel sheets to their ultimate limits in improving the performance of electrical equipment.

This special issue introduces the progress of electrical steel sheet products and evaluation/analysis techniques in JFE Steel, as well as the new products mentioned above.

Based on the corporate vision of JFE Group, “Contributing to society with the world’s most innovative technology,” we will continue to promote the development of technologies and products that are attractive to our customer. In closing, I sincerely request the guidance and encouragement of all those concerned.