Introduction to the Proceedings of Magnetic Desulfurization of Coal Symposium

Auburn University, Auburn, Alabama
March 23-25, 1976

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High gradient magnetic separation (HGMS) is a new technique that provides a practical means for separating micron-size magnetic materials on a large scale and at much faster flow rates than are possible in ordinary filtration. The technique is also applicable to nonmagnetic materials which can be made to associate with magnetic seeding materials. HGMS has already been applied industrially for the purification of kaolin clay but has not as yet been used anywhere else on an industrial scale, despite its apparent applicability and importance in many areas, such as mineral beneficiation, coal desulfurization, water pollution control, etc. This delay in technology transfer reflects a need for revised approaches to scientific and engineering research and development by academic, industrial, and governmental organizations, so as to generate a genuine cooperative effort among the various disciplines involved.

For the first time in this country, all active university, industry, and government research and development groups, as well as leading equipment manufacturers in magnetic separation had agreed to participate in a single technical symposium entitled "Magnetic Desulfurization of Coal: A Symposium on the Theory and Applications of Magnetic Separation" sponsored by Auburn University and Southern Services, Inc., and supported by a grant from the National Science Foundation. The Symposium was intended to offer the chance to exchange the latest results on research and development work in magnetic separation, emphasizing the new and important area of magnetic desulfurization of dry, wet, and liquefied coals. It was also intended to enable participants to discuss and identify research and development needs and opportunities in magnetic separation.

The Symposium was held on March 23-24, 1976 on the Auburn University campus. It ended with an optional visit on March 25, 1976 to the Wilsonville Solvent Refined Coal Pilot Plant of Southern Services, Inc. There were over 130 participants from 22 states and several foreign countries who attended the Symposium, including the current President and Vice President of the IEEE Magnetics Society. The Symposium was highly interdisciplinary in nature, with participants from such diverse fields as physics, chemistry, engineering, mining, metallurgy, geology, etc. There was a total of 30 invited and contributed papers presented in six technical sessions. Titles of the sessions and names of session chairmen are listed separately under the Organization of the Symposium.

The Proceedings were organized by the Guest Editor so that a general tutorial review preceeded presentations of the papers. The tutorial was given by Robin R. Oder, and it was followed by four states of the art reviews on magnetic separation including one on the research needs in magnetic separation by Henry H. Kolm. The next four papers, beginning with the one by F. E. Luborsky and B. J. Drummond, dealt with the subject of mathematical modeling of HGMS. The Proceedings then continued with six papers on different aspects of the theory and applications of HGMS. Application of HGMS to such problems as mineral beneficiation and the removal of oil and solids from water effluents were discussed. Theory of the development of a new superconducting magnet system was also presented.

The main theme of the Symposium was covered in the next nine papers beginning with the one by H. Murray. These papers reported new experimental results on the sulfur and ash removal from dry, wet, and liquefied coals by HGMS. They show the potentiality for utilizing HGMS to solve many problems related to energy (e.g., coal desulfurization), environment (e.g., water pollution control), and productivity (e.g., mineral beneficiation), which are so important for meeting the needs of many nations. Hopefully, these Proceedings will assist our scientists and engineers in coming to an intelligent consensus, so that a clear course can be steered with regard to future research and development in magnetic separation technology.

The Guest Editor is honored to have participated in the organization of the Symposium and the production of the Proceedings. He also wishes to thank all the authors who agreed to participate in the Symposium and submitted papers for possible publication in this Special Issue on Magnetic Separation. Each of these papers was handled by the regular review process of the IEEE TRANSACTIONS ON MAGNETICS and referred by three reviewers. The authors of the manuscripts favorably recommended for publication diligently revised their manuscripts in response to comments and suggestions by the reviewers. These reviewers, most of whom preferred to remain anonymous, deserve our gratitude for their competent reviews which helped the authors revise and improve their manuscripts. Special thanks are due to Dr. F. E. Luborsky, President of the IEEE Magnetics Society, who encouraged us to undertake the task of publishing the Proceedings in this TRANSACTIONS and assisted us in all phases of this endeavor. Special thanks are also due to Winona Coker, Brenda Morrissey, Sharon Priester, and Kathy Roberson who patiently typed hundreds of pieces of correspondence and answered numerous telephone inquiries during the past year. A final note of thanks goes to the IEEE Publications Department for their invaluable effort on the Proceedings.

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