

Automated characterization of magnetic materials

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Future research and development in magnetic materials requires to focus on the following four essential research areas:

1. Automation of research and development or automated scientific discovery
2. Autonomous robotic technology for research and development
3. AI or machine learning technology for magnetic materials research
4. Data collection, integration, and infrastructure for public access

In this presentation, we will discuss these priority research topics, mainly from magnetic materials' characterization viewpoints. A high-throughput material characterization system with quantum beams, such as X-rays and neutrons, leads to a drastic increase in measurements' speed and efficiency. However, we believe that the essence of material characterization is to extract useful information and knowledge for researchers and to automate the research and development process. Only performing high-throughput measurements and collecting a large amount of measurement data and compiling them into a database is not enough to improve materials research efficiency. We will discuss a methodology to maximize the information obtained per time and cost in the measurement [1-4]. While high-throughput measurements are becoming more common, most of the measurement data analysis is done manually by skilled experts, which is a bottleneck in the efficiency of research and development. In addition to freeing researchers from simple tasks to devote themselves to research activities, the measurement and analysis of data will be commoditized so that anyone can perform the measurement and analysis tasks that were previously performed only by skilled experts.

Reference

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