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News Release

Konica Minolta and AIST Develop AI-based Technology to Optimize the Conditions for Compounding and Molding Composite Plastics

Ensuring Consistent Quality of Biomass-derived Plastics and Recycled Plastics

Tokyo (March 13, 2026) – Konica Minolta, Inc. (Konica Minolta) and the research group of National Institute of Advanced Industrial Science and Technology (AIST), Shun Muroga, Senior Researcher, Daisuke Kimura, Researcher and Kenji Hata, Director of the Nanocarbon Material Research Institute, today announced that they have developed an AI-based technology to optimize the conditions for mixing and molding composite plastics.

This technology was made possible by combining core technologies developed by Konica Minolta and AIST. By building an AI model that can make predictions using only a small amount of data, the technology helps ensure the consistent quality of molded plastic products.

The technology will be applied to measurement solutions that harness Konica Minolta's sensing technology as well as process monitoring for intelligent recycled materials and biomanufacturing, which are the seeds for future growth, namely, priority themes in the medium to long term.

Details of the research results will be presented at the 73rd Japan Society of Applied Physics (JSAP) Spring Meeting on March 15, 2026.

Research Background

In recent years, there are high expectations for utilizing biomass-derived plastics and recycled plastics for resource circulation. However, these plastics require additional work to adjust the mixing and molding conditions compared to petroleum-derived plastics due mainly to variable quality caused by the raw materials, chemical decomposition during mixing, and molding defects.

To address this challenge for the sake of green transformation (GX), Konica Minolta and AIST have conducted research on predicting the mixing and molding conditions of composite plastics by using AI.

Konica Minolta and AIST aimed to develop an AI technology suitable for composite plastics by combining their core technologies and utilizing them for materials informatics (MI) and process informatics (PI) based on measurement solutions that leverage sensing technology developed by Konica Minolta over many years, and

multimodal AI† and autonomous experimentation†† technology refined by AIST.

Research Results

In the latest research, Konica Minolta and AIST built multimodal AI models that can predict the optimal mixing and molding conditions for manufacturing molded plastic products with desired physical properties by determining the mixing ratio of plastic types and additives, measuring the mixing and molding quality, and performing proprietary data processing.

Basic data collected by Konica Minolta and AIST was integrated with expertise on increasing development efficiency based on research on multimodal AI that can predict target physical properties from multiple measurement datasets. This has made it possible to build an AI model that can make predictions with a small amount of data and ensure consistent quality.

This research is expected to be extensively applied to various materials which are widely used in the market by utilizing multimodal AI for composite plastics.

Future Plan

Konica Minolta is committed to contributing to decarbonization, resource circulation and a sustainable society by using AI to address challenges in material chemistry.

AIST will help establish and implement technologies for efficiently developing materials and products by improving material DX technology and using it to develop various materials and processes.

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Information about the Presentation

Meeting: 73rd JSAP Spring Meeting 2026

Title: Development of Multimodal Deep Learning Technologies to promote green transformation in plastic plastic compounding and injection molding processes

Presentation No.: 15p-S2_204-6

Date and time of presentation: 14:45–15:00 Sunday, March 15, 2026

Presenters: Shigeru Kojima,[1*] Ko Osawa,[1] Yukako Taka,[1] Michihiro Okuyama,[1] Akihiro Naruke,[1] Miyuki Okaniwa,[1] Daisuke Kimura,[2] Kenji Hata,[2] Shun Muroga[2*]

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Notes

† Multimodal AI:

AI technology used for complex classification and prediction problems based on multiple datasets, just like humans make high-level judgments by processing signals from different sensory organs of the five senses

Reference: Muroga, Miki, Hata, Adv. Sci., 10, 24, 2302508 (2023).

†† Autonomous experimentation:

Technology to quickly search through an enormous number of candidate material and process conditions based on integration of AI with experimental systems and robots, etc.

Reference: Muroga et al., Mater. Horiz., 12, 623-629 (2025).

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