NGK Corporation

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NGK and Laboro.AI Successfully Develop Large-Scale Simulation Software Using Generative AI

-To Be Applied to NGK's Organic Compound Crystal Search Service-

NGK Corporation (hereinafter, "NGK") and Laboro.AI Inc. (hereafter, "Laboro.AI") have jointly established a method for developing large-scale scientific and engineering computational simulation software using generative AI. NGK will apply the results of this project to develop crystal form prediction software for its organic compound crystal search service.

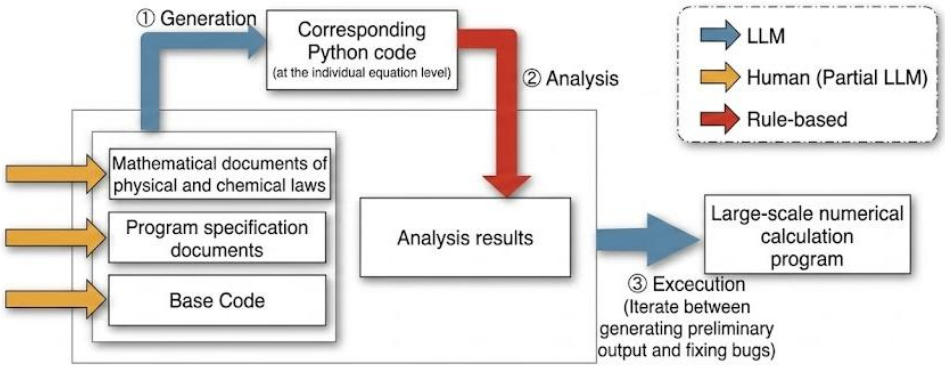
This project aimed to advance the development of simulation technologies important to the manufacturing sector more accurately and efficiently by combining NGK's theoretical and experimental knowledge of infrared irradiation*1 and crystal precipitation*2, and Laboro.AI's expertise in implementing AI technologies.

NGK's organic compound crystal search service aims to selectively create different crystal structures from the same compound components by varying precipitation conditions. Crystal structure is a critical factor in determining properties such as solubility, stability, and moldability. This makes crystal structure an important consideration, particularly in the pharmaceutical field. Obtaining a wide range of crystal forms requires examining numerous combinations of parameters, including temperature, concentration, and infrared irradiation conditions. Since it is difficult to verify all combinations comprehensively through experimental means alone, it is desirable to narrow down the conditions in advance using simulation-based predictions.

To address these challenges, NGK and Laboro.AI have been working to develop simulation software that expresses the physicochemical laws governing infrared irradiation and crystal precipitation as mathematical equations and performs large-scale numerical calculations. Traditionally, the development of such software has relied primarily on manual implementation and verification, creating

challenges such as the risk of program errors and prolonged development periods.

In this verification study, NGK and Laboro.AI evaluated whether a large-scale numerical computation program could be generated correctly by documenting mathematical formulas, conditions, and constraints in a human-readable format and feeding that information into generative AI. As a result, by providing development rules to be followed and model base code, the two companies confirmed that generative AI can generate accurate programs without making arbitrary simplifications or misinterpretations. They also found that a general-purpose coding agent*3 could handle most of the program implementation, which is expected to significantly reduce the human workload to roughly one-third of the conventional level. Consequently, developers will be able to focus more on essential technical considerations, such as examining theories and mathematical formulas, and interpreting results.



Schematic diagram for software development using program auto-generation by LLM.

By applying the program generation method using generative AI that was verified in this project to the development of crystal form prediction software, NGK aims to rapidly expand functionality in response to customer needs and further improve service quality and added value.

In addition, the two companies aim to expand the application of this method to the development of other simulation software, thereby more rapidly advancing the process from research and development to social implementation.

<Comment from Atsushi Miyajima, Senior Vice President, Group Executive, Corporate Manufacturing Engineering>

To accelerate the transformation of our business structure, NGK positions digital transformation (DX) as a driving force behind our corporate reform. Notably, rapidly evolving AI technology is an important factor determining competitiveness in manufacturing, and NGK has been working with Laboro.AI to apply it to manufacturing processes. NGK will leverage the results of this project to address customer issues in organic compound crystal search. In addition, NGK will also apply this technology to accelerate the development of simulation technologies, which are important in a wide range of product designs, with a view to steadily advancing the creation of new products and businesses.

<Comment from Tetsuo Shiihashi, CEO and Representative Director, Laboro.AI Inc.>

I am delighted to be working together with NGK, a company with world-class technologies, to accelerate industrial transformation through AI. This initiative is a groundbreaking example that demonstrated how generative AI could serve as a human partner in the field of scientific and engineering computing, which lies at the core of manufacturing. Laboro.AI will continue striving to achieve its mission of “Creating new forms for all industries” and “Connecting technology and business” by elevating AI technologies into practical business value and unlocking the full potential of Japan’s manufacturing sector.

■About NGK Corporation

Established in 1919, NGK is a ceramics manufacturer with operations across a wide range of business fields including mobility, energy, IoT, and industrial areas. Its core products include automotive parts used in vehicles worldwide and ceramics for semiconductor manufacturing equipment. With an overseas sales ratio of 80% and an overseas employee ratio of 60%, NGK continues to strengthen its presence as a global company. Since 2021, when it established its vision of contributing to carbon neutrality and the digital society with its unique ceramic technologies, NGK has been accelerating the conversion of its business

structure. In April 2026, it changed its company name from NGK INSULATORS, LTD. to NGK Corporation. NGK's "Our Mission," set forth in the NGK Group Philosophy, is "Enriching Human Life by Adding New Value to Society." By offering new products and services, NGK will continue taking on the challenge of realizing a more comfortable and sustainable society. https://www.ngk-global.com/

■ About Laboro.AI Inc.

Laboro.AI Inc. is one of Japan's leading groups of AI specialists. Its mission is "Creating new forms for all industries" and "Connecting technology and business." Guided by this mission, Laboro.AI provides Custom AI, tailor-made AI development solutions that contribute to AI themes focused on value enhancement, which support corporate growth through the deployment of new AI-based business initiatives. https://laboro.ai/ (in Japanese)

*1 A method that applies infrared rays to a substance to influence its molecular vibrational and energy states

*2 A phenomenon in which molecules or atoms arrange themselves in an orderly structure and emerge as solid crystals from a liquid or molten state

*3 An AI that autonomously performs tasks ranging from software development planning and formulation to code generation, revision, and debugging, based on natural-language instructions

Related information

Organic compound crystal search service:

https://www.ngk-global.com/product/crystalsearch.html

NGK Starts World's First Infrared Ray Organic Compound Crystal Search Service:

https://www.ngk-global.com/news/2024/20240325_1.html