

October 27, 2026

Zeon and QunaSys enter into a business alliance agreement to promote full-scale adoption of mathematical model-based development

Supporting more advanced R&D decision-making in manufacturing

Zeon Corporation (Zeon; head office: Chiyoda-ku, Tokyo; President and CEO: Tetsuya Toyoshima) and QunaSys Inc. (QunaSys; head office: Bunkyo-ku, Tokyo; President: Tennin Yan) have entered into a business alliance agreement to bring mathematical model-based development, a new approach to R&D, to a wide range of manufacturing industries. This scheme brings together Zeon's knowledge and methodologies, built up over many years of developing polymers and other materials, and QunaSys's mathematical modeling technology in an R&D approach that helps researchers better understand phenomena and improve their decision-making.

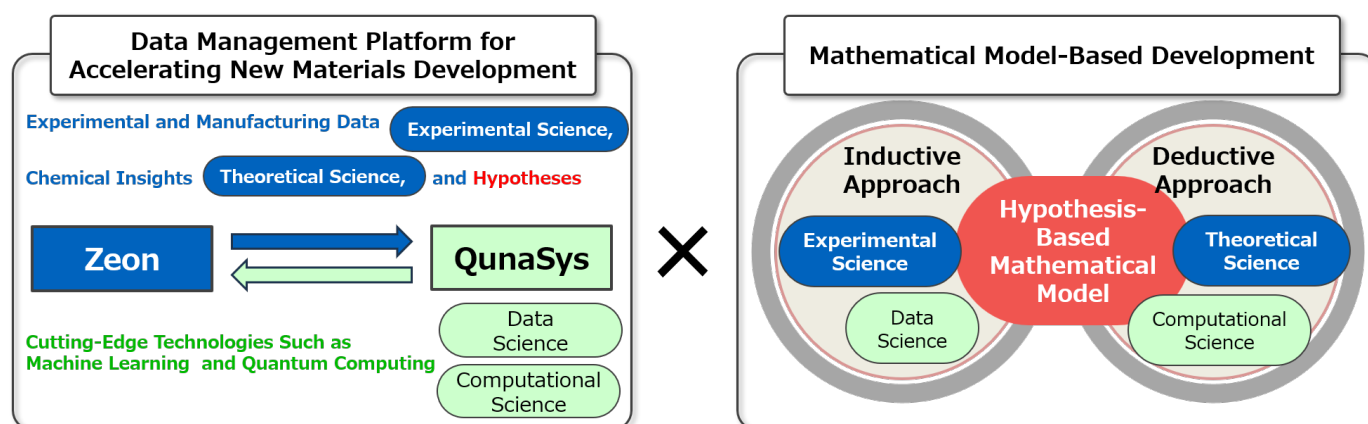
Zeon has accumulated methodologies and practical knowledge in mathematical model-based development during in-house materials development projects and training employees. Through this business alliance, Zeon and QunaSys will collaborate on the full-scale rollout of the scheme to external companies through joint research, proof-of-concept (PoC^{*1}) projects, and the provision of solutions tailored to the specific challenges of individual companies.

● Background to mathematical model-based development

The rapid advancement of infrastructure in today's R&D environment is enabling researchers to draw on diverse types of information, including experimental data, simulations, AI, and materials informatics (MI). The sheer volume of available data and analysis results has sharply increased the number of factors and hypotheses that must be considered, making it more difficult to capture the essence of complex phenomena.

An effective way to address these challenges is to express, in mathematical terms, the mechanistic hypotheses articulated by researchers in the field, quantify their logical progression, and then take the key step of using mathematical formulas (mathematical models) to derive quantitative insights that inform decisions about what actions to take next. Zeon and QunaSys have begun developing a unique R&D methodology to apply this logical problem-solving approach to a wide range of challenges.

Zeon and QunaSys entered into a capital and business alliance in March 2022 with the goal of building a data management platform that will enable advanced technologies such as machine learning, automated experimentation, and quantum computing to be rapidly applied to materials development.^{*2} The data management platform and this scheme complement each other, enabling the efficient and effective validation of mathematical models against data and the generation of high-quality hypotheses as a basis for mathematical modeling.



- Key points of this scheme

What distinguishes mathematical model-based development from other R&D approaches is that it uses mathematical models not merely as predictive tools, but as a foundation for supporting researchers' thinking and decision-making. Using this approach, mathematical models are constructed that can be applied in practical development settings through a series of processes, including defining objectives, decomposing factors, organizing hypotheses, creating mathematical models, verifying and updating them, and incorporating the results.

Mathematical models not only improve the accuracy of predictions but also enable researchers to rationally determine their next course of action by understanding the essence of a phenomenon and narrowing down the hypotheses to be verified. Furthermore, by connecting an understanding of phenomena to concrete decisions about what should be done next to enhance business value, the approach extends its support beyond R&D to the creation of business value.

Putting this approach into practice requires both mathematical modeling technology and expertise in materials development. Combining Zeon's extensive knowledge and methodologies in materials development with QunaSys's mathematical modeling technology can accelerate the implementation of this new R&D approach.

Under its Medium-term Business Plan STAGE 30, Zeon is transforming its business portfolio while identifying the data business as its next growth driver. Zeon intends to develop this scheme into a service that will form part of its data business.

Going forward, Zeon and QunaSys will build up a body of methodologies and practical examples for this approach and work to expand its application to various fields of materials development.

Furthermore, through joint research, PoC projects, and the provision of enterprise solutions, the companies will promote the practical adoption of this mathematical model-based development by manufacturers, thereby contributing to the advancement of R&D and improved development efficiency.

*1 Proof of concept: A process for evaluating the feasibility of an idea or technology for a service or product.

*2 Press release dated March 28, 2022 (in Japanese): [Zeon becomes the first chemical manufacturer to form a business and capital alliance with QunaSys](#)

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