PRESS RELEASE

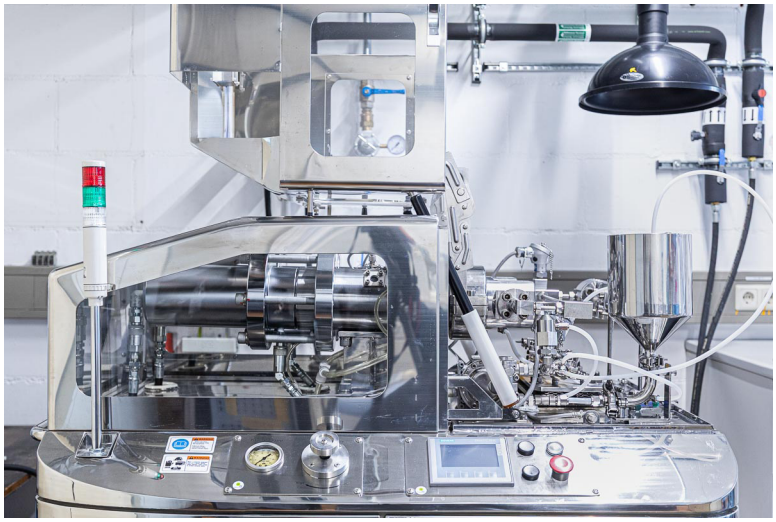
High-Pressure Dispersion for Cosmetics Production

R&D Cooperation Between Sugino Machine and Fraunhofer IPA Expanded

Based on successful battery research, Fraunhofer IPA and Sugino are now expanding their partnership. Since January 2026, the collaboration has also included joint research on cosmetics production, formulation development, and dispersion technology. With this move, the partners are strategically expanding their cooperation into a new, highly innovative market.

The Fraunhofer Institute for Manufacturing Engineering and Automation IPA and the Japanese machine manufacturer Sugino Machine Limited have maintained a research and development partnership since 2021, focusing primarily on dispersion, particle, and biopolymer technologies.

At the end of 2025, the collaboration reached an important milestone in the sustainable production of lithium-ion batteries. Through the use of the high-pressure dispersion process known as wet jet milling, the previously solvent-based processing of lithium iron phosphate cathode materials was completely replaced by an environmentally friendly, water-based binder technology using carboxymethylcellulose (CMC). The results are also the knowledge base for the development of stable, sustainable cosmetic products.



View of the wet jet milling facility at Fraunhofer IPA
(Source: Fraunhofer IPA, Photo: Rainer Bez)

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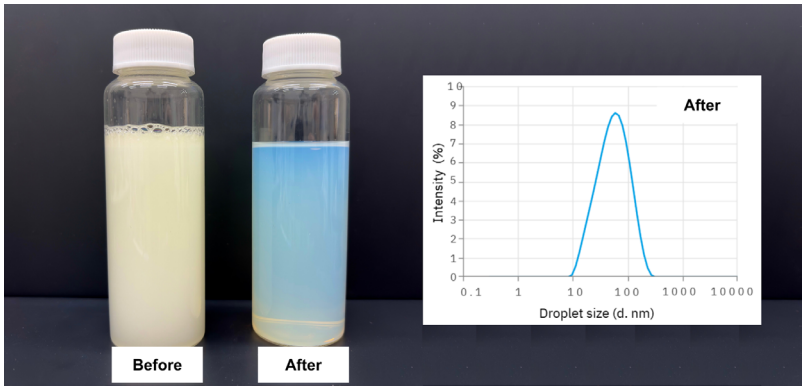
Transfer to the Cosmetics Industry

The advantages of high-pressure dispersion and nano-emulsification can be directly applied to the manufacture of cosmetic products. Small, uniformly distributed particles and droplets prevent separation and sedimentation – a key quality criterion for creams and nanoemulsions. At the same time, stabilizers can be reduced, and shelf life, as well as product safety, can be increased.



Nanoemulsification using Argan oil as an example before and after processing using the wet jet milling method (Source: Sugino)

In addition, the finer particle structure enhances the effectiveness of cosmetic formulations, as active ingredients – such as squalane, microalgae, and natural coffee particles – are better absorbed by the skin. Through fine dispersion, wet jet milling offers a solution to a key problem in cosmetic formulations: the settling or phase separation of ingredients during storage.

Invitation to companies

Fraunhofer IPA invites companies to test their formulations and materials using wet jet milling technology in the institute's laboratories. This collaboration offers early-stage technology testing without investment risk, rapid pre-development of new products, and access to state-of-the-art dispersion technology.

"The joint platform with Sugino is an excellent opportunity, especially for small and medium-sized enterprises, to quickly test innovations in the pre-development phase," emphasizes Ivica Kolarić, Business Segment Manager for Multifunctional Materials at Fraunhofer IPA.

Further information on the production of lithium iron phosphate cathodes:
https://doi.org/10.3390/appliedchem5040033

The Fraunhofer IPA and the Japanese machinery manufacturer Sugino have been collaborating successfully since 2021. The partnership focuses on the industrial processing of biopolymers as well as the development and optimization of pastes and slurries for coatings, energy storage systems, and other functional layers.

Focus on high-performance dispersion processes: Fraunhofer IPA uses Sugino's high-pressure dispersion processes to develop and scale up high-performance dispersion processes for so-called "advanced materials" (novel materials). The goal is to bring new material systems to industrial applications more quickly and efficiently.

Joint laboratory in Stuttgart: A joint laboratory has been established at the Fraunhofer IPA's Dispersion Technology Center in Stuttgart. Modern Sugino equipment, particularly wet jet milling systems, is used there. The work is carried out in the centers for dispersion technology and particle technology, with close involvement of the surface technology and process industry divisions.

Expertise from both partners: Fraunhofer IPA brings extensive knowledge from particle and dispersion research – ranging from basic research to industrial implementation. The focus is on topics such as safety, energy efficiency, and resource efficiency. Sugino contributes its industrial experience in the manufacture of ultra high pressure waterjet machines processing of coating materials, electronic pastes, slurries, and biopolymers. From development to application: Fraunhofer IPA supports Sugino in the design of complete processes, including material selection, degree of automation, energy efficiency, and cost-effectiveness. Together, the partners guide the process all the way to industrial implementation.

Benefits for industry and research: Regional and European users benefit from this cooperation, particularly in the planning, approval, and certification of new facilities for dispersion and biopolymer processes.

The partnership expands an existing German-Japanese network in which the Fraunhofer IPA and the AIST Kansai research institute are already conducting research on biopolymers. With Sugino, this network is now being expanded to include an industrial machinery manufacturer, which will strengthen technological implementation and commercialization.

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