opnMe by Boehringer Ingelheim

Autonomous small molecule synthesis solutions

How would you propose delivering an autonomous end-to-end automated small molecule synthesis solution for medicinal chemistry or chemical development application?

Answers to this question including a proposal for collaboration can only be considered if they arrive no later than October 14, 2026, 11:59 pm PST.

Boehringer Ingelheim

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What is the context of the problem that we would like to solve?

Medicinal Chemistry and Chemical Development are continuously exploring innovative technologies that can further enhance the speed, quality, and impact of small-molecule drug discovery. Recent advances in automation, robotics, digitalization, and artificial intelligence are creating exciting opportunities to transform how molecules are synthesized and accelerate the Design–Make–Test–Analyze (DMTA) cycle. In particular, the ability to connect and automate the complete Make phase, from reagent handling to purified compound delivery, offers the potential to significantly increase throughput, reproducibility, and data generation while enabling scientists to focus on creativity, scientific insight, and complex problem solving.

Through this call for a preferred partnership on opnMe, we invite experts in the field to propose visionary concepts for an autonomous end-to-end small-molecule synthesis platform that covers the complete "Make" phase of the DMTA cycle. This may include automated reagent weighing, dissolution, reaction execution, quenching, analytical work-up, purification, evaporation, and seamless data capture across the entire workflow. We are particularly interested in solutions that integrate advanced digital technologies and AI-driven learning capabilities, enabling continuous optimization of synthesis routes, process control, decision-making, and knowledge generation from experimental results. This platform should also have the flexibility to screen for experimental conditions to rapidly optimize chemical transformations. In terms of maturity of the preferred solution, we are interested in innovative concepts that have reached at least technology readiness levels (TRLs) 4 or 5, i.e., the suggested approach should have been successfully tested at least in a controlled laboratory environment to demonstrate feasibility and ideally under conditions closer to real-world applications.

Our ambition is to get access to the next generation of intelligent synthesis workflows that can rapidly translate molecular designs into high-quality compounds. Such capabilities could accelerate medicinal chemistry and development activities, expand accessible chemical space, improve data quality, and enable faster iteration cycles. Ultimately, this would support the discovery and development of innovative medicines more efficiently, helping bring transformative therapies to patients sooner.

We are interested in a long-term collaborative partnership with the winning solution and could foresee continued development of the proposed solution.

What are our minimal requirements?

Proposed solutions should address the following capabilities for the end-to-end synthesis of new chemical entities (NCEs) and small molecules and display a TRL level of at least 4 or 5:

- Capability to build a system at a large pharmaceutical company in Germany

- Capability to execute ≥ 500 reactions per day*
- Multi-Step Synthesis: Support for at least 3 consecutive synthetic steps within an integrated workflow
- Scale Flexibility: Compound production ranging from 10 mg to 1-10 g*
- Applicability to >50% of patented medicinal chemistry reactions and routes reported in the literature or support for ≥ 10 reaction classes (amide/ester formation, reductive amination, couplings: Suzuki–Miyaura, Sonogashira, Buchwald–Hartwig, SNAr, urea/carbamate/sulfonamide, ether, alkylation, cyclization, hydrogenation**/reduction, standard protections/deprotections, reductions/FGI's: nitro to amine, amide to amine, ester to alcohol, alcohol to halide)
- Material Handling: Automated handling of both liquid and solid reagents [this represents a fixed requirement] including corrosive reagents (i.e., HCl, TFA)
- Inert Processing: Storage and reaction set-up under inert atmosphere conditions (e.g., nitrogen or argon) where required
- Autonomous Workflow Execution: Integration of reagent weighing, dissolution, reaction setup, reaction execution, quenching, analytical work-up, LC purification, evaporation, and yield and purity determination
- AI/ML Integration: Use of artificial intelligence and/or machine learning for route selection, reaction optimization, process control, exception handling, or continuous learning
- Temperature Range: Support for chemistry from room temperature up to 150°C (below RT is a plus)
- Data & Digitalization: Automated data capture, traceability, and workflow orchestration across the synthesis process, requirement of open interfaces for integration
- Human-in-the-Loop Concepts: Appropriate integration of human interaction points for supervision, intervention, and decision-making where beneficial; options for human interventions
- Safety: Incorporation of standard laboratory safety measures, risk mitigation strategies, and safe handling and storage of hazardous reagents and processes

* We would like to point out that there is flexibility regarding specific requirements that are marked with an asterisk. For instance, a limited scale could be offset by flexibility. A lower reaction execution capability could be offset by broader chemistry ranges, etc.

**optional

What potential solutions would be out of scope?

Any solutions with a TRL of less than 4

Explicitly out of scope are more extensive hardware technology development and implementation without any baseline

Any other modalities like peptides, antibodies, siRNA, oligonucleotides, or others

What benefits do we offer to you in exchange for having submitted a solution?

If your project is selected, you will have the opportunity to directly collaborate with experts from Boehringer Ingelheim's Medicinal Chemistry, Chemical Development, and Automatic Lab & Robotic Solutions / Global Facility & Engineering departments who will support you in technology enablement.

Winning proposals can expect appropriate funding to help advance their proof of concept within the next one to two years toward the next relevant inflection point beyond TRL4 or 5. At the same time, we are strongly interested in establishing a long-term partnership.

The following inflection point is in scope: Make "models" fit for our application, including limited hardware modifications and generate a proof-of-concept based on a mutually agreed use case. Explicitly out of scope are more extensive hardware technology development and implementation without any baseline.

Depending on the complexity and maturity of a proposed solution, it may require different budget terms that would be negotiated with the selected partner(s) in good faith. Should we agree on business case and performance criteria, we aim for a productive operational deployment within our environment and would be interested in an extended partnership for other applications.

Depending on the status of the project and applicability, we also offer a range of possibilities to support the winner besides funding.

For instance, partners may have the opportunity to test, evaluate, and advance their technology toward entry into an attractive emerging market in close collaboration with relevant experts. A collaboration with Boehringer Ingelheim, as a leading pharmaceutical company, could also provide strong visibility and support further joint development and maturation of the proposed solution.

For some winners, it may be beneficial to announce their partnership with Boehringer Ingelheim and/or mutually obtained business results. Depending on the conditions of the agreement and mutual needs, we would be open to such an arrangement. We hope that this represents a great opportunity for your solutions to gain recognition in the relevant markets.

What are the key success criteria on which we base our selection for the best answer?

Our review will address the following key success criteria for selecting winning proposals:

- A well-structured proposal with a clear outline of the required funding budget, actionable milestones, and a time plan
- Meet the minimal requirements / acceptance criteria

- Ideally, the proposed solution is based on relevant use cases and validated in relevant environments (TRL 4 and 5)
- Ability to reach tangible results within a timeframe of approximately one to two years

What information should be included in your answer submission?

Please use our answer submission template to provide a 4 - 5-page non-confidential proposal (available for download on the following site).

If confidential data exists that would strengthen the proposal, please indicate that information is available to share under a Confidential Disclosure Agreement (CDA). If we find the non-confidential concept proposal sufficiently interesting, we will execute a CDA for confidential discussions.

Anticipated Project Phases or Project Plan

Phase 1	Please complete your submission by **October 14, 2026, 11:59 pm PST at** the very latest.
Phase 2	Our review of all proposals will be completed by end of November 2026, and scientists will be informed after that.
Phase 3	Start of discussions for the collaboration agreement in Q1/2027.

Submitting a collaboration proposal

- Check the outline of the techMATCH profile "Autonomous small molecule synthesis solutions" on opnMe.
- Alternatively, you may click the "Get Submission Template" banner to access the material transfer template.
- Follow the instructions to upload your submission document (requires login or registration).
- The upload allows you to attach additional application files if desired.
- You will be able to access your final submitted collaboration proposal in your personal dashboard and follow its review status.
- Please also visit the FAQ section on opnMe.com to learn more about our techMATCH program.