

Diligence Report: Excelsior Sciences

Scientific Diligence | Elliot Silk | June 2026

Executive Summary. Iterative chemical synthesis is a powerful and reliable method to make complex molecules and has been machine-automated to make peptides, oligonucleotides, and oligosaccharides. Excelsior expands and commercializes iterative synthesis to include carbon-carbon (C–C) bond forming reactions, standardizing the reaction conditions to repeatable reactions a robot can run reliably and AI can iterate upon. **This enables a rapid, closed-loop synthesis of compounds, accelerating the “make” step of drug discovery.** The founding technology is Martin Burke’s MIDA and TIDA boronate building blocks, coined ‘smart blocs,’ developed over two decades at UIUC and licensed exclusively to the company. The chemistry is established (*vide infra*) and the IP position is defensible. The founding group combines expertise across pharmaceutical discovery, commercialization, and automation and closed a \$95M series A in December 2025.^[1] The open question is not whether the chemistry automates, but how much of drug-relevant space it covers, specifically sp^3 -rich scaffolds. A gap in its accessible chemical space is the construction of non-C–C bonds such as C–N, C–O, and ring closures that make up much of a typical lead. The political climate of the U.S. acts as a tailwind for Excelsior, pushing for the reshoring of chemical manufacturing.

Company Overview

Excelsior was founded in 2024, spun out of Deerfield Management, and operates from laboratory space at the Cure campus in New York City. In December 2025 it announced **\$95M** in financing: a \$70M Series A co-led by Deerfield, Khosla Ventures, and Sofinnova Partners, with a \$25M Empire State Development grant, and participation from Eli Lilly, MIT, Cornucopian Capital, and Illinois Ventures.^[1] The valuation was not disclosed. Stated uses of proceeds are scaling the platform, building an internal pipeline, and forming partnerships across therapeutics and materials science, positioned around domestic reshoring of discovery and manufacturing. The company is a platform and tooling business first and a pipeline developer second, consistent with the view that value in this layer accrues to the synthesis infrastructure, its proprietary chemistry, and the data it generates rather than to a single asset.

CEO Michael Foley holds a chemistry PhD from Harvard, directed the Broad Institute’s Chemical Biology Platform, was founding CEO of the Tri-Institutional Therapeutics Discovery Institute, and founded CombinatoRx, Infinity, and Forma. He has been at Deerfield since 2018, so the company is a Deerfield-incubated venture led by a Deerfield principal, which is a point to examine on governance and round terms. Martin Burke at UIUC developed the bloc chemistry and **previously co-founded Revolution Medicines**, so his laboratory’s IP has been commercialized before. Bartosz Grzybowski built the Chematica and Synthia retrosynthesis systems, which supports the claim that the building blocks can be planned and read computationally.^[5] Jana Jensen, who holds a PhD and an MBA, is COO.

Product and Technology

Excelsior’s platform inverts the usual approach to automation. The unsolved problems in lab automation, including solid handling, air- and moisture-sensitive steps, anomaly detection, and per-reaction method development, are consequences traditional, artisanal chemistry. Excelsior avoids these hurdles by reducing synthesis to a small, fixed set of standardized reactions run on a common smart bloc system, placing molecular diversity in the building blocks rather than in the reaction conditions. **The enabling element is Burke’s MIDA boronate, in which the N-methyliminodiacetic acid caps boron in a tetrahedral sp^3 configuration, making it unreactive toward transmetalation,** bench-stable, crystalline, and amenable to chromatography. Treatment with mild aqueous base unmasks the boronic acid and allows coupling. This converts a coupling that is otherwise sensitive to substrate and conditions into a controlled deprotect, couple, and purify cycle that repeats in the manner of a peptide synthesizer.^[2]

MIDA boronates have a binary affinity for silica that supports a single catch-and-release purification protocol on every cycle, which is the carbon–carbon analog of the resin wash that makes solid-phase peptide synthesis

automatable. Without one general purification step, each intermediate would require its own workup and the loop would not close. A secondary benefit is slow-release coupling, in which *in situ* hydrolysis releases the boronic acid gradually, stabilizing otherwise unstable 2-heteroaryl and vinyl boronates, broadening the accessible chemical space.^[2] These features, more than the robotics, are why the chemistry automates.

The original iterative platform was largely C(sp²) to C(sp²) connections: biaryls, polyenes, and heteroaryls, which are flat, conjugated, natural-product-like structures. This is the region medicinal chemistry has moved away from, because higher C(sp³) fraction is associated with better developability and clinical progression.^[3] A platform optimized for flat couplings is therefore optimized for a less drug-like region of space. Burke's 2022 work addresses this with hyperstable TIDA boronates, a tetramethyl variant of MIDA whose iminodiacetic-acid cage survives conditions that MIDA cannot.^[4] The same building-block system then supports two complementary iterative reactions. **C(sp³)-C(sp²) bonds are formed by stereospecific Suzuki-Miyaura cross-coupling**, which MIDA boronates do not tolerate. **C(sp³)-C(sp³) bonds are formed by Matteson-type 1,2-metallate homologation** using chiral carbenoids and lithiated benzoate esters, which is an Aggarwal-style lithiation-borylation rather than a cross-coupling. The platform is therefore best described not as a single reaction but as a building-block paradigm spanning Suzuki-Miyaura coupling and Matteson homologation, unified by the MIDA and TIDA cage; TIDA's hyperstability is required because the organolithium and carbenoid conditions of the homologation, and MIDA cannot tolerate the harsher stereospecific C(sp³) coupling. The remaining question is quantitative. For a representative lead-optimization series, what fraction of compounds is reachable from current commercial and proprietary block inventory, in how many cycles, and at what yield and purity, and how are the non-C-C bonds (amide and aniline C-N, C-O, and saturated ring formation) that constitute much of a finished drug installed. If those bonds are present only because they were pre-built into the blocks, the platform is better described as a scaffold and vector assembly engine than as a general synthesizer, and the addressable space should be sized on that basis.

Because every molecule is assembled the same way from a defined set of blocks, the platform produces uniform, structured synthesis and assay data, with the blocks serving as tokens for a chemistry model. Therefore, **the more durable asset may be the data rather than the hardware**. This data is free of the reaction-condition variability that limits the use of literature-mined datasets and the fixed chemistry also reduces the discovery-to-process handoff. The qualification is process economics. The coupling is Pd-catalyzed and the sp³ homologation uses stoichiometric organolithium-derived carbenoids, both with protected boronates and purification at each cycle, so process mass intensity, metal load, and reagent handling are demanding. The scale-up claim is most credible for complex molecules with long conventional routes and least credible for simple targets that are already inexpensive to make.

Competitive Landscape

Excelsior sits within a long-standing division in automated synthesis between building a general-purpose machine that can run most reactions and building a specialized machine that runs a few general reactions which still reach most molecules.

Chemify (Cronin, Glasgow) is the general-purpose bet and the most direct competitor. It digitizes existing human chemistry through a programming language, χ DL, that drives robotic hardware against a large, curated library of validated reactions, now running in its Chemifarm facility. It raised more than \$50M in a Series B in October 2025 and reports partnerships with six of the twenty largest pharmaceutical companies, which is commercial traction Excelsior does not yet have.^[7] Its limitation is that each reaction must still be validated and optimized, and the robot is still executing human chemistry. The two companies make opposing bets on the same problem. Excelsior bets that constraining the chemistry yields reliability, uniform data, and a single route from discovery to manufacturing. Chemify bets that software plus a growing library of validated reactions will eventually deliver breadth. If the general-purpose approach reaches acceptable reliability, breadth is the stronger position. If it does not, machine-native chemistry is.

Design-first and full-stack companies are adjacent rather than directly comparable. Recursion, now combined with Exscientia, operates a large data-generation engine but works around the synthesis bottleneck

by predicting which molecules to make so that fewer are made, and it uses conventional automated chemistry when synthesis is required, which leaves the synthesis problem in place for the novel space where it is hardest. Lila Sciences, which has raised roughly \$550M, is a well-funded full-stack autonomous-lab competitor, and Isomorphic and Insilico occupy the design layer that is becoming commoditized.^[7] These companies compete for the same outcome, faster validated experimental data, but from the design side. Excelsior's nearer-term competition is therefore Chemify and the internal build-versus-buy decisions of large pharma, where the Lilly divestiture to Arctoris and the Recursion and Exscientia merger point toward buying.

On defensibility, the two leaders rest on different foundations. Chemify's position depends on breadth, software, and existing partnerships, while Excelsior's depends on a chemistry primitive, Burke's exclusively licensed MIDA and TIDA portfolio, together with the structured data a fixed-chemistry platform produces. The chemistry primitive is harder to design around and is the stronger long-term position if coverage is sufficient. In summary, Excelsior holds a defensible IP position and a close fit to the build-step thesis, trails Chemify on facility build-out and commercial validation by roughly two years, and depends on a single technical question, namely the fraction of drug-relevant space its constrained chemistry can reach.

Key Risks

- 1. Chemical-space coverage (technical, commercial).** Suzuki–Miyaura coupling forms C–C bonds. The C–N bonds of amides and anilines, C–O bonds, and saturated ring formation account for a large fraction of a finished drug and are not formed by iterative coupling. If these bonds and most sp^3 complexity must be pre-built into the blocks, the space reachable from a fixed block set is narrower than general synthesis, and the platform functions more as a scaffold and vector assembly tool. This is the primary value driver and the first item to quantify.
- 2. Building-block economics (operational, commercial).** The platform's generality is bounded by the available inventory of boronic acids and sulfoxide precursors. Reaching a new region of chemical space requires synthesizing and validating new MIDA or TIDA blocks, which is itself bespoke chemistry. Placing diversity in the blocks shifts the synthesis bottleneck rather than removing it, and the cost and time to expand the library is a recurring expense rather than a one-time build.
- 3. Process economics at scale (commercial).** Iterative coupling is Pd-catalyzed, uses stoichiometric protected boronates, and purifies at each cycle, giving high process mass intensity and precious-metal load. The claim that one route serves both discovery and manufacturing is most credible for complex molecules with long conventional routes and weakest for simple targets that are already inexpensive to produce. The reshoring economics depend on which targets the platform is applied to.
- 4. IP durability and freedom to operate (legal, commercial).** The moat depends on the Burke MIDA and TIDA patents licensed from UIUC.^[5] The foundational MIDA filings date to the late 2000s and will expire within the commercial horizon, so the strength and term of the exclusive license, particularly for the newer TIDA filings, should be examined. Because the sp^3 capability rests on Matteson-type homologation as well as cross-coupling, competitors can pursue iterative sp^3 assembly with alternative building-block systems, for example Aggarwal-style lithiation–borylation using benzoate or pinacol boronates, so the defensibility rests specifically on the MIDA and TIDA cage and its compatibility with both coupling and homologation. This should be assessed for freedom to operate and design-around risk.
- 5. Competitive timing (commercial).** Chemify is roughly two years ahead on facility build-out and pharma partnerships and is pursuing broader coverage through a different technical route. If the general-purpose approach reaches acceptable reliability before Excelsior's coverage and data advantages compound, the breadth position could narrow Excelsior's window.
- 6. Incubation, governance, and business-model focus (structural).** Deerfield incubated the company, co-leads the round, and the CEO is a long-time Deerfield principal. With the valuation undisclosed, the round terms, valuation step-up, and board composition should be reviewed for alignment between insiders and outside investors. The company is also positioned as both a platform and tooling provider and an

internal pipeline developer, across therapeutics and materials, with no clinical assets or partnership revenue disclosed, so the mechanism of value capture is not yet defined.

References

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- [5] MIDA/TIDA patents (Univ. of Illinois) licensed to Excelsior; J. Chem. Educ. 2025 disclosure. Foley: Broad Chemical Biology Platform; founding CEO, Tri-I TDI; Deerfield (2018–). Grzybowski: Chematica/Synthia retrosynthesis.
- [6] Autonomous discovery in the chemical sciences (review), arXiv:2003.13755, on general-purpose versus specialized synthesis-machine approaches.
- [7] Chemify: Business Wire / C&EN, Oct 21, 2025 (\$50M+ Series B; χ DL; Chemifarm, Glasgow; 6 of top-20 pharma). Lila Sciences: roughly \$550M raised, 2025.