BESLUT	Datum för beslut:	Diarienummer:
	2025-11-10	KTH-RPROJ-0276016

Beslut om ett strategiskt forskningsinitiativ, KTH POLARIS

Detta beslut har undertecknats elektroniskt.

Beslutet

KTH:s vicerektor för forskning beslutar att:

- Finansiera *KTH Polaris* med 1 mnkr centrala medel under 2025/2026.
- Utse Daniel Söderberg, CBH-skolan, som ansvarig forskningsledare för satsningen.
- Återrapportering enligt utvärderingskriterier, för dialog om fortsatt bidrag ska vara Forskningsberedningen tillhanda 10 november 2026.

Ärendet

KTH:s initiativ för forskningssatsningar inrättades enligt förslag från Översyn av KTH:s särskilda forskningssatsningar (Dnr: KTH-RPROJ-0276016). Förslaget innebär att centrala medel ska kunna användas till direkt finansiering av tre- till femåriga forskningsinitiativ med det huvudsakliga målet att dra in externa forskningsanslag.

Under föregående år har Forskningsberedningen arbetat vidare med att konkretisera förslaget, och kommit fram till ett antal kriterier för ett KTH Strategiskt initiativ samt kriterier för utvärdering (Protokoll 10/2024):

Kriterier för KTH Strategiskt forskningsinitiativ:

- Strategiska forskningsinitiativ är ett sätt för KTH att kraftsamla inom områden där det krävs nya samarbeten som är viktiga utifrån KTH:s vision och mål. Det kan dels vara att förstärka ett område som redan finns eller utveckla ett nytt.
- Strategiska forskningsinitiativ ska kunna initieras av både forskare, KTH:s ledning och forskningsberedningen.
- Strategiska forskningsinitiativ är satsningar med central finansiering på 0,5 - 3 mnkr per år i max fem år.
- Målsättningen för en beviljad satsning är att generera betydande externa bidrag till KTH om totalt minst 100 mnkr. Det kan vara externa bidrag från flera olika finansiärer som tillsammans stärker området för forskningsinitiativet. Utväxlingen blir den viktigaste indikatorn som följs upp årligen.

Kriterier för utvärdering av beviljat KTH Strategiskt forskningsinitiativ ska ske efter ett år enligt nedan:

- Projektansökan – En eller flera projektansökningar.
- Kraftsamling - Vilka PI´s är med i projektansökan/ansökningar?
- Förberedelsearbete inför utlysningar.
- Exempel på nya forskningssamarbeten.

Dessutom kommer behov av central finansiering, budgetutrymme och strategisk relevans att vägas in vid Forskningsberedningens bedömning.

Till Forskningsberedningens möte den 24 september inkom förslaget KTH POLARIS med professor Daniel Söderberg, CBH-skolan, som ansvarig forskningsledare, se bilaga 1.

Baserat på Forskningsberedningens diskussion rekommenderas Vicerektor för forskning att stödja att förslaget beviljas sökt budget, 1 mnkr för år 2025/2026. En utvärdering ska ligga till grund för diskussion om fortsatt finansiering och i vilken omfattning. (KTH-RPROJ-0276016 Protokoll 8/2025).

Detta beslut har fattats av vicerektor för forskning Annika Borgenstam efter föredragning av forskningsrådgivare Johan Schuber.

Kungl. Tekniska högskolan

Annika Borgenstam, vicerektor för forskning KTH

Johan Schuber, forskningsrådgivare, avdelningen för forskningsstöd inom Verksamhetsstödet

Bilaga 1: projektförslag

Sändlista

<u>För åtgärd:</u>

Daniel Söderberg, CBH-skolan

Kopia till:

Skolchef CBH-skolan

Controllergruppen, controller@kth.se

Chefen för avdelningen för forskningsstöd Maria Gustafson

Kommunikationschef Gunilla Iverfelt

Anna Aminoff

Sanna Pehrson, avdelningen för forskningsstöd

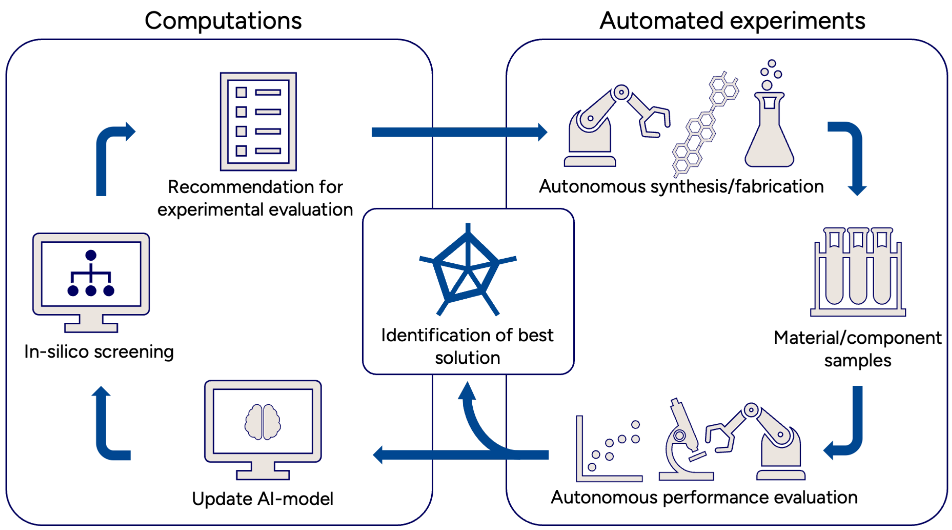
Expeditionsdatum:

YYYY-MM-DD

KTH strategic research initiative

Project idea

POLARIS will establish an on-site, high-throughput, closed-loop system at KTH that researchers across several domains can use for target-driven development of advanced multifunctional soft materials and intermediates for further processing. The system integrates in-silico screening, experiment recommendation, autonomous synthesis/fabrication, automated performance evaluation, and continuous model updates, leading to data-driven identification of best solutions.



Existing advanced KTH instrumentation and national large-scale facilities (for example, MAX IV/ForMAX and ESS) are connected as complementary nodes for specialised measurements. The localisation of the system at KTH guarantees access, quality, and rapid iteration. The initiative supports multiple classes—materials, organic synthesis, dispersions, thin films, gels, porous media, and composites—spanning wet and dry processing.

POLARIS aims to strengthen KTH's excellence in soft matter science by introducing a component that supports the generation of large, repeatable datasets, which can leverage the development of AI-driven methods. It will also have the potential to contribute to second-cycle education by making the system accessible to project-based courses and theses. POLARIS will also contribute to advancing sustainability by favoring bio-based inputs, aiming to develop soft matter concepts with a lower environmental footprint and recyclability.

Title

POLARIS – Platform for Orchestrated Learning & Autonomous Research in Sustainable Materials

Applicants

This is a strategic proposal from six departments at KTH: Daniel Söderberg, Fibre and Polymer Technology; Fredrik Lundell, Engineering Mechanics; Peter Dinér, Chemistry; Carina Lagergren, Chemical Engineering; Cecilia Williams, Protein Science; and Antonius Van Maris, Industrial Biotechnology. Additional departments can join.

Funding request

A total of 3 MSEK over three years (1 MSEK+1 MSEK+1 MSEK)

Purpose

POLARIS will deliver a validated, accessible closed-loop system that shortens time-to-prototype and increases success probability for materials and intermediates. The starting point will be bio-based components/constituents, spanning from lignocellulosic feedstocks to proteins, as a source for functional soft materials. Within three years, we will demonstrate end-to-end optimisation on several use cases with measurable gains in energy use, mechanical performance, selectivity and throughput. The vision is to position KTH as a European reference site for accelerating autonomous materials fabrication, integrating experiment, modelling, and AI.

The initiative unites strong KTH environments into a visible, shared capability, reducing duplication and increasing the hit rate for large competitive grants. It creates persistent data/model assets that benefit research and education, enabling reproducible, industry-grade workflows, reinforcing KTH's position as a strong partner in national and international industrial collaborative activities.

Industry will be demanding engineers who can run AI-assisted labs, validate models and scale processes responsibly. POLARIS will contribute to several MSc and PhD programmes, including course projects and internships utilising the system.

Why at KTH

KTH combines processing and materials labs, chemical and biotech (CBH), and mechanics characterisation, modelling and flow labs (SCI) with advanced characterisation (SAXS/WAXS, micro-CT, rheology, surface chemistry) and established links to MAX IV and ESS. We are major users of national HPC (NAISS) and have extensive industrial networks in forest/bio, energy, vehicles, aerospace/defence and medtech. Internationally, autonomous laboratories and materials acceleration platforms are strategic priorities. Within materials research, it is believed that such systems will be a requirement to be competitive in the future. Today, there exists a handful of closed-loop platforms that integrate simulation with automated processing and characterisation that have recently emerged, exemplified by Berkeley Lab's A-Lab, which autonomously synthesised dozens of crystalline solids, the University of Liverpool's robot chemist at the Materials Innovation Factory, and NREL's Autonomous Experimentation program focused on energy materials.

KTH POLARIS differentiates KTH by i) through our ability to integrate experiment–model–AI with the engineering science perspective, strengthened by our partnerships, centres and projects with industrial partners, and ii) that the system will be able to produce sufficient amounts to allow evaluation of performance in engineering applications.

Research team

The applicants represent complementary leadership across CBH and SCI with delivery in synthesis/biotech, processing/mechanics, multiscale characterisation and modelling/AI. The team has experience operating large programmes and facilities, providing both scientific excellence and the operational capability required to commission and run a complex, shared infrastructure.

Strategy for funding

The internal seed funding will establish POLARIS as a broad KTH effort, serving as an initiative to prepare larger external funding proposals, including those involving collaborations with other universities.

In the short term (years 1–2), the internal POLARIS funding will support the following activities:

- A systematic mapping of existing KTH capabilities and ongoing initiatives that can be integrated into POLARIS
- Co-creation workshops with researchers from the participating departments and schools to define use cases and scientific challenges
- Design and initiation of pilot projects that demonstrate elements of closed-loop operation and generate preliminary results
- Development of a diversified external funding portfolio

Specifically, during year 1, a central, but not exclusive, objective is to develop a case for a significant infrastructure-type investment of approximately 150 MSEK to build, commission and validate the closed-loop platform. This work will be performed in collaboration with the KTH Development Office to attract external donations in connection with KTH's 200th anniversary.

In the medium term (3–5 years), we will use the results, network and preliminary data generated in POLARIS to consolidate as part of at least one Excellence Cluster (VR and/or Vinnova) and/or Excellence Centre (VR), as well as to link strongly to, if funded, a Strategic

Research Area in Advanced Materials (VR proposal submitted November 2025), targeting a combined level of 30–40 MSEK per year in external support at KTH.

In the long term (6–10 years): We operate a rolling centre with international partners, joint EU flagships, and renewed national centre support, maintaining a steady run-rate and expanding to new application domains while providing structured access for industrial and academic users.

In the first year, the seed grant (1 MSEK) will primarily support the PI's time and coordination resources needed to carry out the activities outlined above and produce a concise roadmap document and detailed plans for years 2 and 3. These deliverables will be used to evaluate the initiative and inform decisions on subsequent steps and commitments.