Call for WISE Industrial Doctoral Student and Postdoc Projects (WISE-ip2)

Application deadline

2024-11-19 at 14.00

The Wallenberg Initiative Materials Science for Sustainability (WISE, https://wise-materials.org) is the largest-ever investment in materials science in Sweden and will encompass major efforts at Sweden's foremost universities over the course of (at least) 10 years. The aim is to create the conditions for a sustainable society by researching the next generation of ecofriendly materials and manufacturing processes. This will also facilitate better technology for energy systems of the future, and to combat climate change, pollution, and toxic emissions. Specifically, efforts will be devoted to identifying new or significantly improved materials, which provide a distinct advantage in physical, chemical, biological, or functional performance when compared to existing materials and technologies. This relates to materials that demand fewer resources, are less environmentally hazardous, and enable sound and efficient recycling processes. WISE will also explore materials that, when used in energy technology, generate less negative climate impact under operation, while offering high performance and efficiency when in action at large scales.

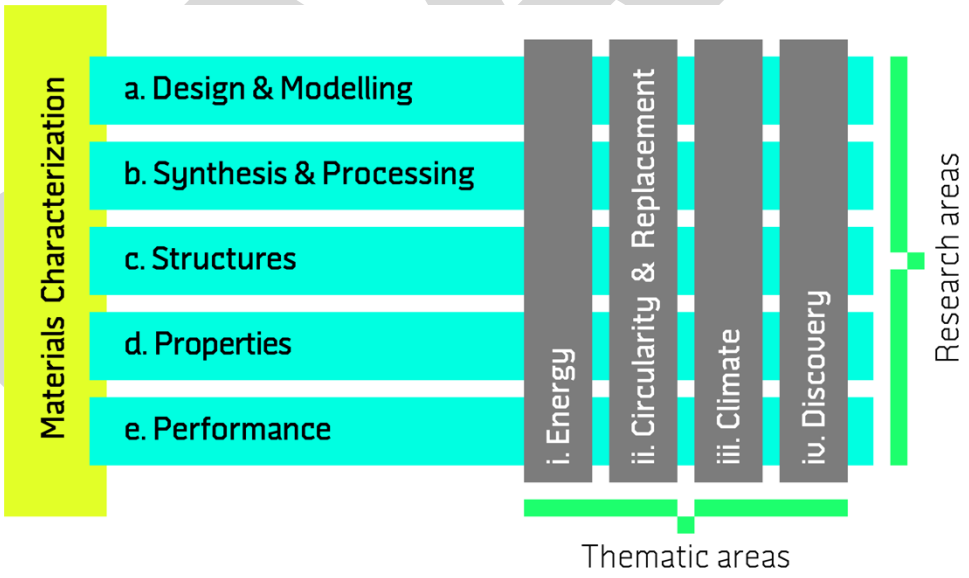

Figure: WISE matrix

In this call, WISE is now offering funding for up to 8 industrial doctoral student positions and up to 8 industrial postdoctoral researcher positions within materials science for sustainability at the six partner universities, Chalmers, KTH Royal Institute of Technology, Linköping University, Uppsala University, Stockholm University, and Lund University, as well as Luleå University of Technology, and the affiliated groups of excellence at Karlstad University, Umeå University, and Örebro University. The call refers to basic and need-driven research. Proposals in all areas of

WISE are welcome. That is, proposed projects should be easily identifiable in the "WISE program matrix" (see figure). Proposals are for a single PhD student or single postdoc researcher.

WISE has the aim to promote a wide coverage of PhD and postdoc projects spanning the WISE matrix and with supervisors at different stages of academic seniority. WISE welcomes applicants with different backgrounds, experiences, and perspectives – diversity enriches our work and helps us grow. Preserving everyone's equal value, rights, and opportunities is a natural part of WISE.

Eligibility

This call is open for partnerships between academic and industrial researchers, where each proposal must include a main academic PI as well as a main industry PI.

The academic PI (with qualification to be main supervisor according to the respective university) must be employed ≥50% at one of WISE's six partner universities (Chalmers University of Technology, KTH Royal Institute of Technology, Linköping University, Uppsala University, Stockholm University, and Lund University), at Luleå University of Technology, or be a pre-selected researcher (employed ≥50%) at Karlstad University, Umeå University, or Örebro University.

The industry PI must be an employed with a Swedish company or company with substantial activity in Sweden. See further criteria below in Evaluation.

If you currently have WISE-funded activities (WISE-ap project, WISE-ip project, WISE Fellowship), your proposal should demonstrate significant novelty in comparison to your previous activities.

Evaluation

Project proposals will be evaluated by a panel comprising members of the WISE University Representative Group, the advisory committee and industry. The panel will generate a list for final decision by the WISE Board.

The evaluation criteria that will be used for evaluating the project proposals are:

Project

- Relevance to WISE (contribution to the program and placement in the matrix)
- Scientific excellence and novelty of the proposed research
- Feasibility
- Potential to collaborate with other WISE projects or initiatives
- Relevance and significance of how the proposed project contributes to sustainability.

PhD student or postdoc

- In case of PhD student project, grades from Master education and (if applicable) scientific merits and relevant industrial experience.

- In case of postdoc project, scientific merits, taking into account academic age and relevant industrial experience.
- Application must include an identified candidate. The candidate should at the latest be employed by the applying industry in time for the WISE Welcome Meeting 2025 (tentatively 28 August 2025). Employment must be permanent (*tillsvidareanställning*).

Industrial PI

- Industrial partner's financial and operational conditions to actively participate in the project.
- The industrial partner should have considerable activity in Sweden.
- Merits of the industrial PI (publications, patents, management/ leadership experience, etc.), experience with collaborations with academia.

Academic PI

- Scientific merits taking into account academic age
- International research experience
- Pedagogical skills and merits
- Ability and experience to collaborate with academia and industry
- Doctoral student and supervisor constellation with underrepresented gender are encouraged.

Proposal structure

The proposal should be composed in Times New Roman font, 12 pt, single-spaced text, and be structured as follows:

- **Project Description (max. 4 pages*)**
    - Motivation, Significance, and Scientific Challenges
        - Include a clear description of the visions and goals, the distinguishing features, and foci
        - Include a motivation for why a doctoral student or postdoc is most appropriate for the proposed project
    - State of the Art
    - Scientific Approach, Methodology, and Novelty
        - Describe the research contribution
    - Preliminary and Previous Results
        - Include results from previous related projects, if applicable.
    - Research Environment and Supervision (time should be spent at both university and in industry, see Appendix 1)

        - Description of research environment and infrastructure (demonstrating feasibility of the proposed project)
        - Research supervision plan (for PhDs) and/or career development plan (for postdocs)
        - List of key collaborators and their roles for the project, if applicable, potential to collaborate with other WISE projects or initiatives
    - Select main WISE thematic area i-iv and research area a-e (see WISE matrix above)

- If you currently have WISE-funded activities (WISE-ap project, WISE-ip1 project, WISE Fellowship), describe your **new proposal's relation and possible overlap** to these existing activities. WISE expects significant novelty in comparison to your previously funded WISE activities. (max. 1 page*)

- **Relevance and Significance of Sustainability Aspects (max. 2 pages*)**
    - Relevance to WISE, including detailed explanation of primary (and possibly secondary) focus in the WISE research areas (a-e) and thematic areas (i-iv) (see figure above)
    - Sustainability Aspects
        - Description of how the project relates to the Sustainability Development Goals (SDGs) highlighted by the WISE program (see Appendix 2)
        - Description should include advances/advantages *as well as potential sustainability-related drawbacks or conflicts with other SDGs*
    - Sustainability Significance/Impact Aspects (relate to SDGs or other aspects, see below and Appendix 3)
        - Description should include quantified impact or advances/advantages on sustainability.
        - Below are some <u>examples</u> to consider, if applicable, but not be limited to:
            - Life cycle analysis
            - Input to the process in terms of recycled or upcycled material, biobased materials, and industrial symbiosis.
            - The use of persistent or hazardous chemicals that can cause harm or accumulate in a circular flow.
            - Impact on land-use and biodiversity
            - Efficient manufacturing and energy use in manufacturing
            - Efficient water use
            - Output in terms of waste from production
            - Emissions to water or air e.g., hazardous chemicals or noise
            - Energy and material efficiency
            - Efficient recycling including efficient use

- **In case of PhD project: CV of the PhD student candidate**, max 2 pages[1] including:
    - Grades from Masters and Bachelors degrees
    - Scientific merits
    - If applicable, relevant industrial experience
    - If applicable, describe any conflicts of interest[2]

- **In case of postdoc project: CV of the postdoc candidate**, max 2 pages including:
    - PhD year
    - Periods of leave (parental, health-related, etc.), if applicable
    - List of past and ongoing projects in industry and academia if applicable
    - (Optional) Short descriptions of utilization, commercialization, outreach, pedagogical, or other activities of relevance
    - List of publications (5-10 selected publications)
    - Link to Google Scholar profile or similar
    - If applicable, describe any conflicts of interest[2]

- **Letter of intent from the company, if applicable.**
    - The PhD student candidate or postdoc candidate must be identified, but at time of proposal submission not necessarily employed at the applying industry. In case the candidate is not yet employed, include a letter of intent from the industrial partner to support the intention and timeline to employ the candidate.

- **CV of the industrial PI**, max 2 pages including:
    - Name, title, position, and affiliation
    - Education
    - Brief overview of projects, responsibilities, and previous interactions with academia
    - Brief statement of management/leadership/supervision experience
    - If applicable, describe any conflicts of interest[2]
    - Appendix may include:
        - (Optional) List of max 10 publications of relevance (no time limit)
        - (Optional) List of patents
        - (Optional) Link to Google Scholar profile or similar

[1] Grades from Masters and Bachelors degrees can be added beyond the page limit.
[2] Conflicts of interest could include, for example, any financial or personal dependencies between the company, the scholar, the higher education institute, or the supervisor(s)/PI(s).

- **CV of the PI (main supervisor)**, max 2 pages including:
    - Name, title, and affiliation
    - PhD year
    - Previous positions (and relevant supervisors)
    - Periods of leave (parental, health-related, etc.), if applicable
    - List of ongoing grants/projects
    - (Optional) Short descriptions of utilization, commercialization, outreach, pedagogical, or other activities of relevance
    - Number (not name list) of current and number of former PhD students, postdocs, and master students
    - List of 10 publications including:
        - 5 most important publications (during past 15 active years)
        - 5 recent publications most relevant for the proposed project (during past 7 active years)
    - The PI should provide relevant bibliometric data and additional excellence markers of relevance to the proposed project.
    - Link to Google Scholar profile or similar
    - If applicable, describe any conflicts of interest[2]

* References can be added beyond the page limit.

Responsibilities (for academic recipients)

Academic recipients of awarded proposals (*i.e.*, applicant/ supervisor) will become WISE faculty members and are expected to be engaged in the WISE program, including, *e.g.*, attendance at WISE workshops and events, ensuring that WISE-financed PhD students and postdocs are members of WISE Graduate School, use WISE affiliation and acknowledge WISE and KAW in publications, conference presentations and in relevant communication channels, as well as submit requested reports to WISE Program Office. In addition, WISE expects that recipients of project funding from WISE are committed to maintaining an updated ORCID account.

Industry recipients of awarded proposals (*i.e.*, applicant/ supervisor) will also be invited to WISE events and are expected to submit requested reports to the WISE Program Office.

Funding

Participating parties are expected to co-finance the project to the extent necessary for implementation. As the program is keen to know the extent of the industry's co-financing, this information will be requested during financial reporting.

PhD student project

To applying industry

- In total 2.4 MSEK for a PhD student, paid out in lump sums every year[3] for a time period of 4-5 years (corresponding to an activity level in the range 100-80% respectively).

To the host university

- Salary (including 50% social fees) for supervision up to 10% of full-time salary for 4 years during maximum 5 years.
- Costs for travel and consumables will be covered up to 10 kSEK/year (total 40 kSEK)
- The costs include a maximum compensation of 3.5% surcharge for premises and a maximum of 18.45% surcharge for Indirect Costs

Postdoc project

To applying industry

- In total 1.9 MSEK for a postdoc, paid out as a lump sum of 950 kSEK/year (2 years full-time). If an SME, in total 2.4 MSEK for a postdoc, paid out as a lump sum of 1200 kSEK/year (2 years full-time).

To the host university

- Up to 300 kSEK in total (during two years) to cover salary cost for one host, travel costs for the host and consumables.
- The costs include a maximum compensation of up to 50% for social fees (LKP) and a maximum of 3.5% surcharge for premises and a maximum of 18.45% surcharge for Indirect Costs

More information about the doctoral studies in the WISE program and the duties of WISE postdoctoral research fellows can be found here (link to Appendix 1).

Submission

The proposal should be submitted as a single PDF file to the submission portal: https://www.lyyti.in/WISE-ip2_submission

Timeline

2024-08-12 Call opens

2024-11-19 Call closes at 14.00

[3] 600 kSEK/year at 100% activity grade

2025-04-15 Decision of accepted projects communicated
(prel. date)

2025-08-27 All candidates ready to start (individual decision can be made later)
(prel. date)

2025-08-28 WISE Welcome Meeting (mandatory participation for PhD students and postdocs)
(prel. date)

Appendix 1: Doctoral and postdoctoral studies in the WISE program

The WISE graduate school is dedicated to provide the skills needed to analyze, develop, and contribute to the interdisciplinary area of materials science for sustainability. Through an ambitious program with research visits, workshops and meetings at the partner universities, and visiting lecturers, the graduate school actively supports forming a strong multi-disciplinary and international professional network between PhD students, postdocs, researchers, and industry. The graduate school provides added value on top of the existing PhD programs at the partner universities, providing unique opportunities for students and postdocs who are dedicated to achieve international research excellence with industrial relevance.

An industrial PhD student is enrolled at the partner university and will follow the university's curriculum for attaining their PhD degree. Together with WISE academic PhD students, the industrial PhD students will join the WISE graduate school, where they are required to follow courses on materials science and sustainability in addition to their core program courses.

An industrial postdoc is a person with a PhD who conducts industrially motivated academic research in the context of a collaboration between a company and a university research group for two years full-time. The industrial postdoc is 100% employed by the company. An industrial postdoc could be ideal, for example, for recently graduated PhDs who are considering a career as an industry researcher or PhDs who are already employed at a company and engaged in research tasks.

Industrial PhDs and postdocs are expected to be active in the WISE program, including, e.g. attendance at WISE workshops and events; active membership in the WISE Graduate School; using WISE affiliation and acknowledgement of WISE and KAW in publications, conference presentations, and in relevant communication channels; and submitting requested reports to the WISE Program Office. In addition, WISE expects that recipients of project funding from WISE are committed to maintaining an updated ORCID account for publication tracking.

The activity level should be in the range 80% to 100% corresponding to a duration of 2 to2.5 years (postdoc) or 4 to5 years (PhD student). Both industrial PhDs and postdocs are fully engaged in academic research during their project work time but share their time between industry and university. For an industrial PhD, a minimum of 20% working time should be spent at both university and industry, respectively. For an industrial postdoc, 20-50% working time should be spent at industry and 50-80% working time at university.

Appendix 2: UN Sustainable Development Goals (SDGs) from a materials science perspective

Affordable materials able to be produced and recycled, enabling economic advancement

Resource-efficient use of materials for processes enabling an increased value of (raw) materials

Materials for safe and increased productivity of food, at the same time reducing food waste

Construct and operate infrastructure from sustainable functional materials

Materials enabling good health and protection against hazardous compounds

Improved extraction and ennobling methods for rare raw materials and developing replacement materials

Affordable low-tech and high-tech materials for life-long learning and education

Settlements built up from materials that are safe, resilient, and sustainable

Materials enabling affordable security technology empowering women

Efficient (re)use/recycling of (natural) materials for sustainable production/ consumption with lower chem release into soil, air and water

Materials to capture, clean, transport, pressurize, filter, purify, store, and detoxify water

Materials to protect and develop oceans, targeting marine ecosystems and food production

Green materials for efficient technology and infrastructure to harvest, transport, store, and convert energy

Materials promoting reforestation, enrichment of soil, and restoration/ maintenance of biodiversity

Appendix 3: Sustainability considerations for excellent materials research conducted in WISE

Research activities follow the outlined topics and thematic areas of the WISE matrix, see below. Sustainability, defined to lie on three pillars (environmental/climate, economic, and social), is included in all research activities of WISE as an integrated component with respect to relevance and significance. This implies that research within WISE should contribute to developments in materials and technologies – from new fundamental insights to real-world implementation – that meet the needs of the present generation, without limiting the possibility for future generations to solve their needs and demands. Research projects funded by WISE should primarily focus on:

ENERGY. Research will include the studies and development of materials that enable a fossil-fuel free society, with net-zero emissions, that can fulfill the Paris Agreement. This includes technologies to generate, convert, store, and distribute energy, including large-scale centralized systems, via mobile tools and vehicles, to heavily distributed intelligent and miniaturized systems. Emphasis is devoted to a wide range of fossil-free, efficient, safe, and/or renewable energy carriers, including electricity, heat, solids, liquids, and gas. Advancing materials for energy technologies should enable future technologies to become affordable, scalable, manufacturable, implementable, and based on abundant materials. They should rely on compounds produced and processed using sound environmental and ethical conditions, and with the lowest possible impact on the environment. While at use in technological setups for energy applications, materials are developed targeting performance parameters such as efficiency, energy and power density, stability, cyclability, lifetime, and capacity retention, etc.

CIRCULARITY AND REPLACING MATERIALS: Circular materials. There is an urgent need to shift from the linear production model that depletes resources, is harmful to the planet, and generates large amounts of waste, to circular systems that eliminate waste and pollution and circulate products and materials at their highest value. Circularity considers the full loop of prime extraction, beneficiation, design, manufacturing, use, disposal, and finally recycling, reusing and/or remanufacturing (upcycling). Circular materials research will include studies on materials design to prevent waste, natural resources management, novel use of by-products, substitution of hazardous, rare and costly components, and efficient recycling and upcycling of high-performance materials with minimal generation of hazardous chemicals. Important aspects and considerations include: end-of-life materials design, life cycle analysis, energy consumption, CO_2 footprint, release of chemicals and (other) novel entities with hazardous properties, safety, atom-efficiency, durability, behaviour and cost of recycling or reuse vs. cost of extraction of (non)renewable resources.

CLIMATE: Cleaning, mitigation, and protection. Climate change and pollution are the challenges of our generation. Deriving and producing new materials are processes associated with the use of solvents and generation of undesired by-products such as hazardous chemicals/pollutants, micro/nanoparticles, solid and liquid waste, greenhouse gases, and more, that are distributed into and absorbed by our atmosphere, biosphere, and geosphere. First, it is crucial to develop material systems and technologies that enable reductions of pollutants and undesired by-products preferably to zero. Secondly, functional materials is a potent tool which can serve as passive/active systems that collect, store, separate, and transport by-products/pollutants and

then finally transform those into desired high-quality materials, possible to recycle, or into suitable sinks such as for carbon. Research will aim to reduce the emission of greenhouse gases and hazardous chemicals using safe, flexible, and energy efficient processes and materials. Methodologies to sense and monitor hazardous components in the atmosphere, biosphere, and geosphere are also included.

DISCOVERY. New challenges coupled to sustainability will arise as our society further develops along with the growing global climate and environmental crises. New methods and techniques within materials research are continuously developing and enable novel technical solutions. This gives room for material scientists to act swiftly by suggesting radically new forms of material systems and techniques to combat arising and future challenges, as well as older yet unsolved problems. Material research develops according to both long-term knowledge-seeking strategies and sudden unforeseen findings, which provide novel opportunities on the facets of material science, ranging from modelling, synthesis and processing to structures, properties, and performance. Discoveries will be highlighted as a critical component of WISE to provide necessary dynamics in enabling transformation of our world into a sustainable society, and the focus of this research should be in line with the WISE mission.

WISE will support scientific projects where necessary sustainability components have been considered and treated in a holistic and balanced manner. It is especially crucial to encompass and treat sustainability criteria that, for instance, are interconnected or are mutually in conflict with each other. Your suggested research will most likely include sustainability measures not only residing within one thematic area (WISE Matrix i-iv), but rather in several. It is important that an integrated sustainability consideration of your suggested research is detailed and outlined in a transparent and honest manner, openly addressing ecological/ environmental/ sustainability/ economic/ social pros *as well as cons*.

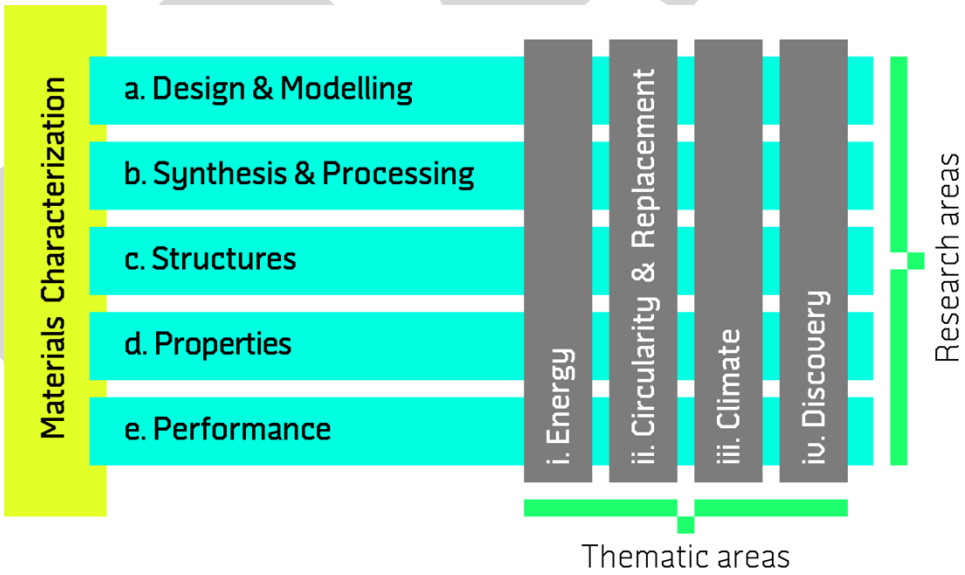

Figure: WISE matrix.

Typically, your reasoning for sustainability should include both analytical motivations (*e.g.*, calculations), combined with logical rationales worded as a discussion. In addition to relevance, your suggested research should contribute to the strategic development goals, as identified by the United Nations (https://sdgs.un.org/goals). Very often this requires solutions either at large scales, while in use as a future advanced material operating in energy technologies, as a circular

material, or some other way serving our environment, while creating resources for society. While the perspective and impact of WISE is much longer than for 2030, an “Agenda 2050” should be envisioned.

For WISE, the considerations for sustainability are, and should be, substantial, and naturally reflect the urgency of reorienting our world toward long-term environmental, economic, and social sustainability. In the end, your sustainability outline and motivations will make your suggested science more relevant, significant, and competitive at the forefront of material science for the future. We look forward to receiving your proposal.