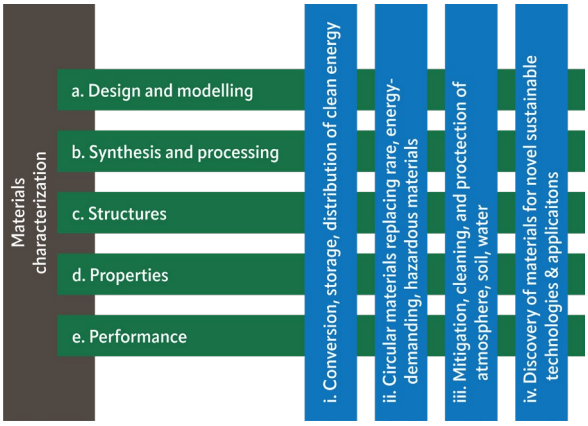
Call for WISE industrial PhD student and postdoctoral researcher positions in Materials Science for Sustainability (call: WISE-ip1)

Application deadline

30 April 2023

The Wallenberg Initiative Materials Science for Sustainability (WISE, https://wise-materials.org) is the largest-ever investment in materials science in Sweden and encompasses major efforts at seven of Sweden's leading 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 identify new or significantly improve 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.

In this call, WISE is now offering funding for up to 12 industrial doctoral student positions and up to 12 industrial postdoctoral researcher positions within material science for sustainability at the six partner universities, Chalmers, KTH, 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.



*The WISE program matrix. Green a-e indicate **research areas** and blue i-iv indicate **thematic areas**.*

WISE has an ambition to promote a wide coverage of PhD and postdoc projects spanning the WISE matrix and with supervisors within academia and industry. Advancing diversity and equality is an important goal for WISE. Applicants with different backgrounds, experiences, and perspectives are welcome – diversity enriches our work and helps us grow. Preserving everyone's equal value, rights, and opportunities is a natural part of WISE.

Application Process

The proposal should follow the format of Appendix 1. The application should be compiled as a single PDF and submitted jointly by the industry and university PIs via the WISE application portal https://www.lyyti.in/WISE-ip1-submission (opens 1st of April 2023) no later than 2023-04-30, 23:59.

Eligibility and Evaluation Process

The evaluation criteria that will be used for evaluating the project proposals are listed below.

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 28 August (= date of WISE Welcome Meeting).

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.

Funding and the WISE program

PhD student project

To applying industry

- In total 2.56 MSEK for a PhD student, paid out in lump sums every year[1] 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 2).

Timeline

2023-04-01	Call opens
2023-04-30	Call closes
2023 around end of May	Decision of accepted projects communicated
2023-08-28	All candidates ready to start*
2023-08-28	WISE Welcome Meeting (participation for PhD students and postdocs is mandatory)
* Individual decisions can be made earlier.	

[1] 640 kSEK/year at 100% activity grade

Appendix 1: Proposal format

The final document should consist of a single compiled PDF.

The proposal should be composed in Times New Roman font, 11 pt, single-spaced text, and be structured as follows.

- Project Description (max. 4 pages, references can be added beyond page limit)
    - Select main WISE thematic area i-iv (see WISE matrix in the call text)
    - Select main WISE research area a-e (see WISE matrix in the call text)
    - 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)
    - 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 2)
        - 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 for the project, if applicable, potential to collaborate with other WISE projects or initiatives

- Relevance and Significance of Sustainability Aspects (max. 3 pages, references can be added beyond page limit)
    - Sustainability Aspects related to Sustainability Development Goals (SDGs)
        - Explicit description of how the project relates to the SDGs highlighted by the WISE program (see Appendix 3)
        - Reflect on potential sustainability-related drawbacks or conflicts with other SDGs
    - Sustainability Significance/Impact Aspects (relate to SDGs or other aspects, see below and Appendix 4)
        - Description should include quantified impact or advances/advantages on sustainability.
        - Below are some examples 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 supply chain
  - ~ 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

- In case of a PhD project: CV of the PhD student candidate (max. 2 pages[2])
  - Grades from Master's, and Bachelor's degrees
  - Scientific merits
  - If applicable, relevant industrial experience
  - If applicable, describe any conflicts of interest[3]

- In case of postdoc project: CV of the postdoc candidate (max 2 pages)
  - 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[3]

- 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 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)
  - 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[3]
  - Appendix may include:

[2] Grades from Master's and Bachelor's degrees can be added beyond page limit

[3] 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).

        - (Optional) List of max 10 publications of relevance (no time limit)
        - (Optional) List of patents
        - (Optional) Link to Google Scholar profile or similar

- CV of the academic PI (main supervisor) (max 2 pages)
    - Name, title, and affiliation
    - PhD year
    - Previous positions (and relevant supervisors)
    - Periods of leave (parental, health-related, etc.), if applicable
    - List of ongoing national and international grants/projects
    - (Optional) Short descriptions of utilization, commercialization, outreach, pedagogical, or other activities of relevance, including previous interactions with industry
    - Number (not name list) of current and number of former PhD students, postdocs, and masters 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)
    - Bibliometrics summary (total citations, h-index, plus other optional metrics of relevance) supported via link to Google Scholar profile or similar
    - If applicable, describe any conflicts of interest[3]

Appendix 2: 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.

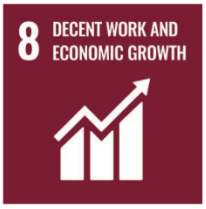
An industrial postdoc is a person with a PhD who conducts industrially motivated academic research in the context of a collaboration between a company and a university research group for two years full-time. The industrial postdoc is 100% employed by the company. An industrial postdoc could be ideal, 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.

Both industrial PhDs and postdocs are 100% engaged in academic research 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 3: UN Sustainable Development Goals (SDGs) from a materials science perspective[4]

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

[4] Duplicated from the WISE Program Brochure, available to download at wise-materials.org/about/

Appendix 4: 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:

CLEAN 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.

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.

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.

DISCOVERIES. 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.*

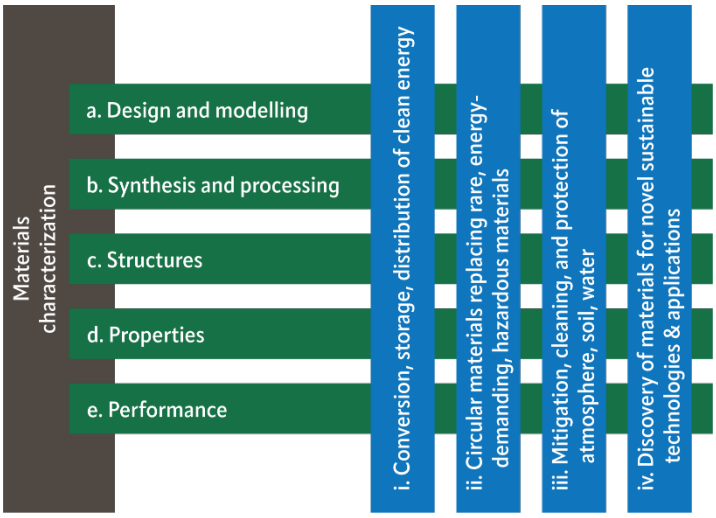


Figure 1. WISE matrix.

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.