Call for WISE Academic Doctoral Student and Postdoc Projects (WISE-ap2)

Application deadline

2024-02-28

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.

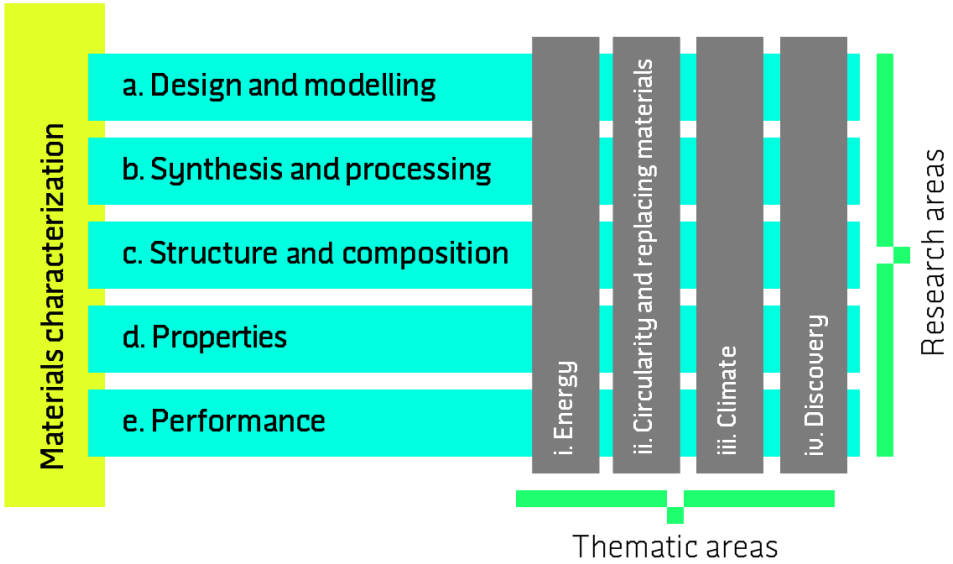

Figure: WISE matrix

In this call, WISE is offering funding for up to 27 academic doctoral student positions and up to 27 academic postdoctoral researcher positions. 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 a 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 academic researchers (with qualification to be main supervisor according to the respective university) at 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, as well as specifically pre-selected researchers at Karlstad University, Umeå University, and Örebro University.

A maximum number of applications can be submitted from each university, depending on WISE association status (see table). The pre-screening and selection of applications will be handled internally at each university as described under Evaluation Process.

Note that you should not apply through the WISE submission portal unless already approved during your university's pre-screening process. For more information contact your WISE University Representatives (URG members, https://wise-materials.org/about/organization/).

	PhD proposal	Postdoc proposal	Total (per university)	Total (all universities)
Chalmers, KTH, LiU, LU, SU, UU	10	10	20	120
LTU	3	3	6	6
Other associated (KaU, ORU, UmU)	1	1	2	6
Total →				132

A researcher can submit a maximum of one proposal as principal investigator. If you currently have WISE-funded activities (WISE-ap1 project, WISE-ip1 project, WISE Fellowship), WISE expects significant novelty in your proposal in comparison to your previous proposal.

Evaluation Process

Projects will be pre-screened by each participating university to a maximum number of proposals (see table) before submission to WISE. The pre-screening process may vary between universities, and it is the responsibility of the potential applicant to determine and adhere to any local instructions (contact the local URG member for details). Once submitted to WISE, the project proposals will be evaluated by one of four panels (corresponding to thematic areas i-iv, see WISE matrix above) of qualified international scientists, generating a short-list. When needed, the WISE advisory committee will assist the panels in the evaluation of the sustainability goals.

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

- Scientific excellence and novelty of the proposed research (novelty will be of extra importance for proposals submitted to evaluation panel iv)
- Scientific merits of the applicant, taking into account academic age

- Feasibility
- Relevance to WISE (contribution to the program and placement in the matrix)
- Significance of how the proposed project contributes to sustainability goals

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
        - 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
    - Select main WISE thematic area i-iv (see WISE matrix above)

- If you currently have WISE-funded activities (WISE-ap1 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 1)

        - 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 2)
        - 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

- **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

* References can be added beyond the page limit.

Responsibilities

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.

Funding

PhD student project

Salary (including 50% social fees) for PhD student, 4 years full-time during maximum 5 years.

Salary (including 50% social fees) for supervision up to 10% of 4-year FTE during maximum 5 years.

Costs for travel and consumables will be covered up to 50 kSEK/year (total 200 kSEK).

Indirect costs and premises can be added up to maximum 21.95%.

Postdoc project

Salary (including 50% social fees) for postdoc, 2 years full-time.

Salary (including 50% social fees) for mentorship up to 5% of 2-year FTE during maximum 2 years.

Costs for travel and consumables will be covered up to 25 kSEK/year (total 50 kSEK).

Indirect costs and premises can be added up to maximum 21.95%.

Submission

The proposal should be submitted as a single PDF file to the submission port link provided by your local WISE University Representative Group member.

Timeline

2024-02-28 Call closes

2024-09-10 Decision of accepted projects communicated

2025-05-31 Recruitment finished

Appendix 1: UN Sustainable Development Goals (SDGs) from a materials science perspective

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

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

Materials enabling good health and protection against hazardous compounds

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

Materials enabling affordable security technology empowering women

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

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

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

Construct and operate infrastructure from sustainable functional materials

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

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

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

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

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

Appendix 2: 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.*

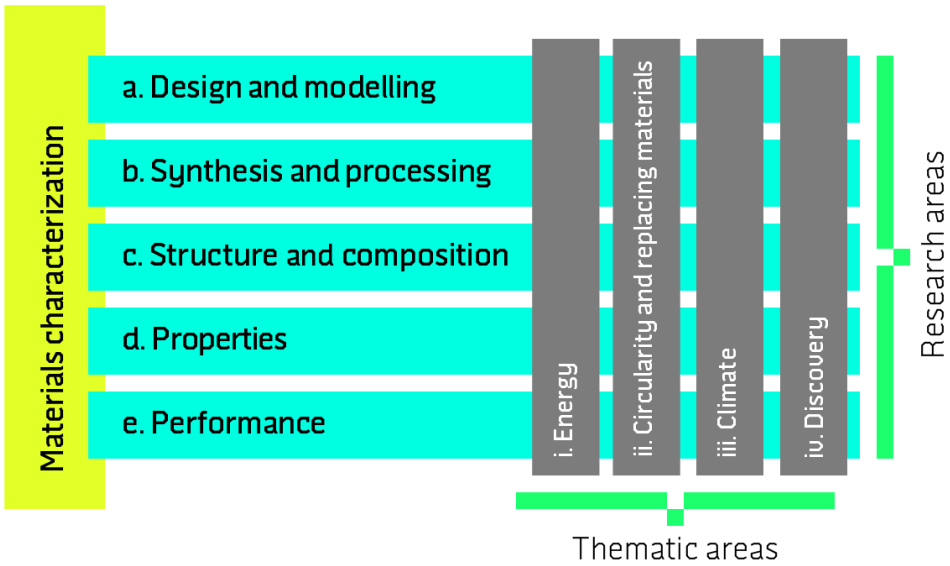

Figure: WISE matrix.

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.