

STRATEGY 2018–2025

# DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

Norwegian University of Science and Technology – NTNU

## Guide to readers

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# 01

VISION

VALUES

SOCIAL MISSION AND AMBITION

OVERVIEW OF CHALLENGES 2018

MAIN OBJECTIVES IMA 2025



OUR VISION:

# MATERIALS SCIENCE AND ENGINEERING FOR A BETTER WORLD



Knowledge provides people with opportunities and influence, as well as a foundation for making wise choices. Knowledge inspires and challenges; it changes attitudes and mindsets. Knowledge developed and disseminated at the Department of Materials Science and Engineering (IMA) should benefit society, and it should be possible to trust that our findings are based on best scientific practice.

The development of materials science and engineering creates opportunities for increasing sustainable value creation and finding answers to some of today's major challenges. Through the United Nations, the world has agreed on 17 Sustainable Development Goals, and through research, teaching and our other priorities, IMA will focus its contribution on:

- **UN Goal 3** "Good Health"
- **UN Goal 4** "Quality Education"
- **UN Goal 5** "Gender Equality"
- **UN Goal 7** "Affordable and Clean Energy"
- **UN Goal 9** "Industry, Innovation and Infrastructure"
- **UN Goal 11** "Sustainable Cities and Communities"
- **UN Goal 12** "Responsible Consumption and Production"
- **UN Goal 13** "Combat Climate Change"

# OUR VALUES

NTNU's values serve as a guide for all staff and students, and our behaviour reflects these values. Our work is founded on four values: to be creative, critical, constructive and respectful.



Photo: Terje Tøbbe

## CREATIVE

Academic freedom is the basis for NTNU's activities. We get to grips with challenging questions and tasks, and seek innovative solutions based on our academic breadth. IMA supports the development of disciplines, people and cultures. We value and encourage innovation among students and staff as well as innovative teaching and research.

## CRITICAL

Our activities build on fundamental democratic values and we represent an unprejudiced and independent voice. Hallmarks of our academic culture are debate, critical reflection, evidence-based knowledge, impartiality and high ethical awareness. We challenge conventional ideas and solutions.

## CONSTRUCTIVE

We engage in an open and solution-oriented dialogue with the outside world and emphasize both external and internal collaboration. We take social responsibility and we influence, correct and develop each other and our environment through dialogue and dissemination of knowledge. IMA emphasizes co-determination and active involvement by students and employees.

## RESPECTFUL

Every employee and student has a responsibility to contribute to a work and study environment characterized by respect and consideration. We facilitate personal growth and development of skills. We contribute to diversity and equal opportunity in society and in our own activities. We promote equality and tolerance. At IMA, we show respect for varying attitudes and opinions.

# OUR SOCIAL MISSION AND AMBITION



Photo: Per Henning

In materials science and engineering, the Department should become an attractive player in research and education, help to solve regional, national and global challenges, and contribute to the development of a sustainable society for future generations.

IMA will ensure high-quality research-based dissemination of knowledge and contribute to innovation and creating value that meet the challenges of society. Our programmes of study will offer our students theoretical and practical competence that enables them to solve these challenges.

Our ambition is that IMA will be recognized as the best place for materials scientists and engineers to be. This means that:

- We attract talented students (BSc, MSc, PhD and lifelong learning), both nationally and internationally.
- We attract talented teaching staff, researchers and guests in international competition.
- We are an attractive place to be, due to our academic environment, our laboratories and our other infrastructure.

We will work towards recognition of materials science and engineering as a discipline and understanding of its importance by the public as well as by experts. We will contribute to sustainable development of society (with reference to the UN's Sustainable Development Goals) through initiatives including:

- development of new materials and improvements in existing materials based on chemical, electrochemical and metallurgical expertise
- how we use and recycle materials and material resources
- reduction in energy use and emissions during production and recycling
- innovation
- extensive collaboration with other research institutions, business and industry

# OVERVIEW OF CHALLENGES IN 2018

Our activities are long-term. At the same time, national and global social changes are rapid and wide-ranging, and some of their effects are unpredictable. The importance of knowledge, quality and expertise is increasing, and IMA faces higher demands and expectations from society. This picture includes both external and internal challenges.



Photo: Terje Trobe

## EXTERNAL CHALLENGES

### More intense competition

Both within teaching and research, we face more intense competition nationally and internationally. IMA aims to develop as a learning and research institution to meet this intensifying competition through constant and well thought-out renewal. We will strive to ensure that a culture of improvement is a hallmark of the Department.

### Interaction with society

We educate graduates for a long professional career in a society that is constantly changing. At the same time, we aim to achieve research that benefits society both nationally and internationally. Prerequisites for this are close contact with society and established industry as well as a proactive approach to the challenges of the future.

## INTERNAL CHALLENGES

### Merger/co-location

IMA has arisen through a merger between academic communities from the former Sør-Trøndelag University College (HiST) at Kalvskinnet and the old NTNU at Gløshaugen. The merger presents us with both challenges and significant potential for realizing benefits from the merger. IMA aims to complete this merger process through initiatives that include relocating the academic community at Kalvskinnet to Gløshaugen. A

principle for the entire merger process is that we will maintain or improve the quality of teaching in all our programmes, and we will strengthen our research and other priority tasks.

### Academic integration

IMA will strive to give our students the best educational offering possible. The merger gives us excellent opportunities for this, especially once we have a common location at NTNU's Gløshaugen campus. Academic integration entails coordination of courses, laboratories for teaching and research, as well as bachelor's and master's projects. At the same time, we will give priority to courses that strengthen our identity as well as to actions and activities that promote the distinctive character of each programme of study. These aspects must be balanced.

### Long campus

IMA will work actively to achieve co-location of all our academic communities through the development of the Campus project. At the same time, we will pay attention to proximity to relevant units in SINTEF, proximity to laboratories that are important to our activities (TEM, NanoLab, etc.), and proximity to external enterprises in our field. IMA will work towards a future location that fulfils all these considerations in the best possible way.

# MAIN OBJECTIVES IMA 2025

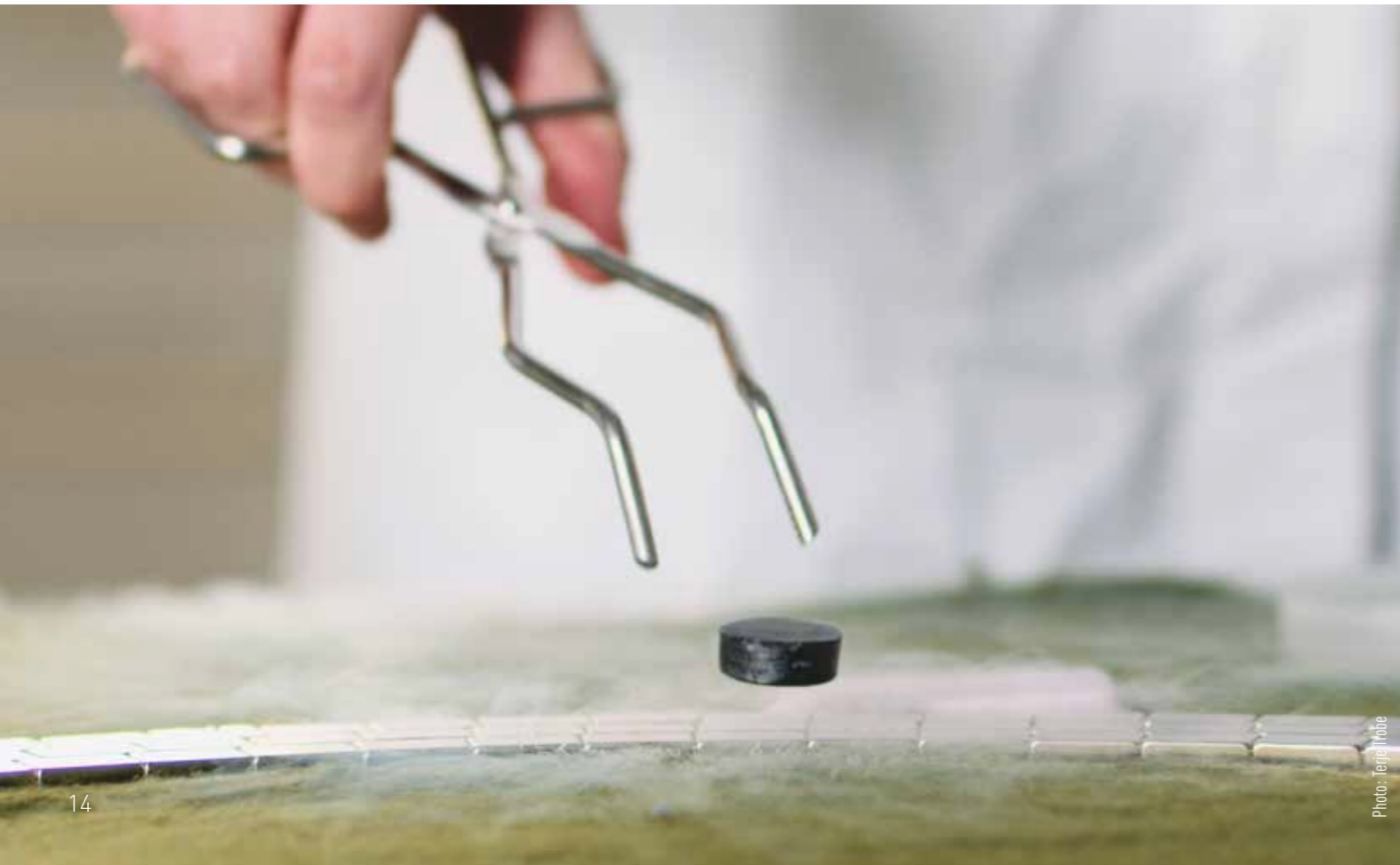


Photo: Terje Tode

In 2025, we have strengthened our position as a knowledge institution in materials science and engineering. We have systematically improved the quality of all our activities. At the same time, we have paved the way for at least two of our academic groups to be internationally leading.

The best students choose IMA. Our learning environment is innovative and exciting, and our student environment is recognized as the best there is. Graduates with a diploma from our programmes of study are highly attractive in the job market.

We perceive IMA as one unified department, with creative academic communities and exciting interdisciplinary collaboration. We have realized the potential inherent in co-location of our activities. During the strategy period, we have succeeded in our systematic efforts to develop a culture of improvement and innovation among our students and staff.

Our employees are clearly visible in society and contribute actively to its development. We are skilled in modern communication methods and disseminate our results according to open access principles.

We have developed and modernized the technical and administrative support services and provide services of the right quality tailored to users' needs. Each employee's skills are valued and developed systematically. Together we have created an attractive and safe environment for work and student life characterized by generosity, mutual respect, gender balance and diversity, and our staff and students speak of the Department with pride.

Through active HSE work, we ensure the safety of our students, guests and staff and we help to develop best practices and attitudes.

We have contributed to our vision of Materials Science and Technology for a better world by setting clear priorities for our efforts and resources in line with our priority goals for sustainable development.



# 02

## CORE TASKS

OUR EDUCATION AND LEARNING ENVIRONMENT

OUR RESEARCH

OUR ACTIVITIES IN INNOVATION

OUR DISSEMINATION AND OUTREACH



# OUR EDUCATION AND LEARNING ENVIRONMENT

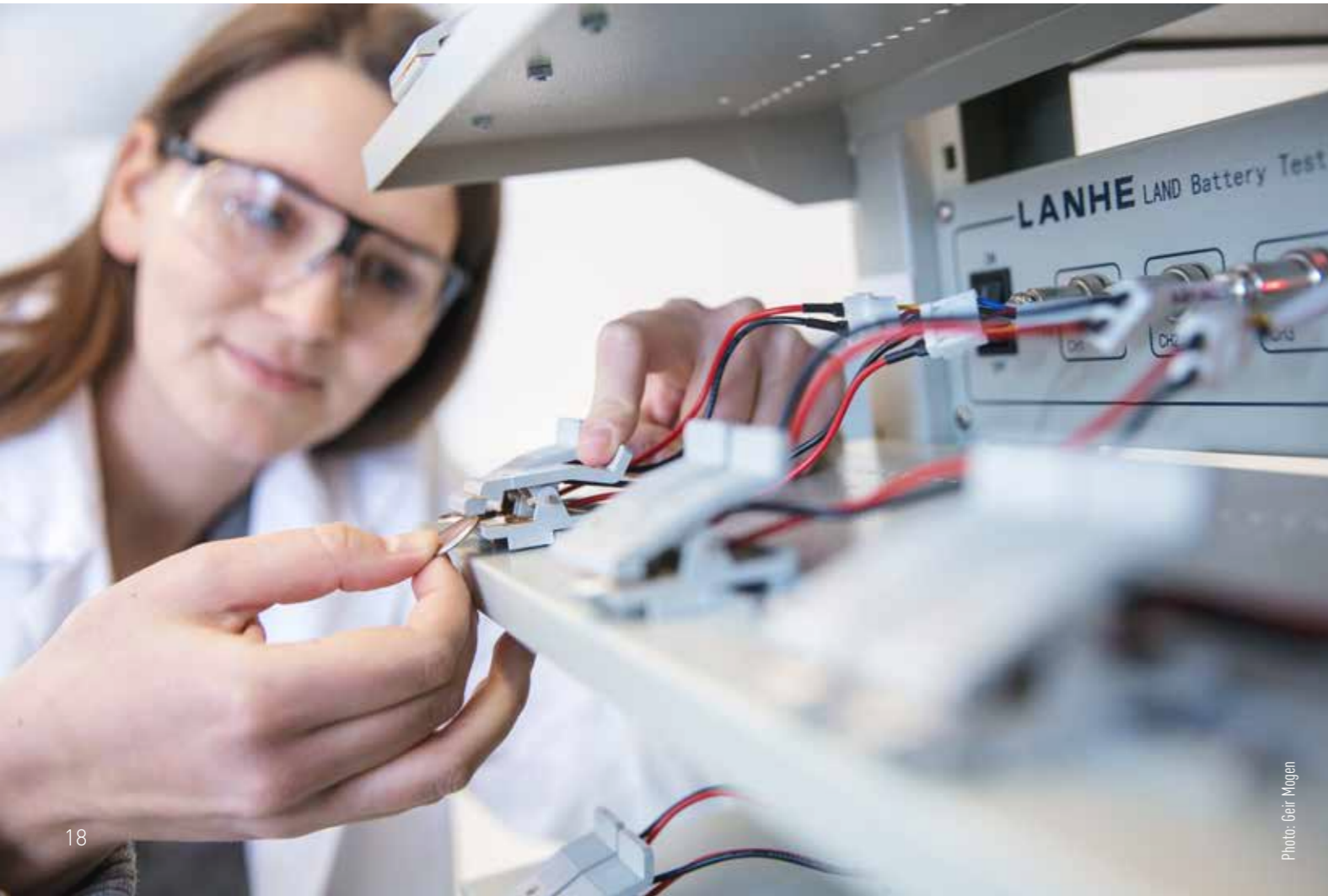


Photo: Geir Mogen

## GOALS

### IMA's programmes of study will:

**Provide** attractive, research-based education, including continuing and further education, of high quality; be in the forefront of our disciplines in Norway, and facilitate extensive international student exchange.

**Educate** graduates with relevant and sought-after skills for the private and public sectors, and provide students with a solid foundation for lifelong learning.

**Develop** a sense of belonging and social affiliation in collaboration with the study programmes and student associations, as well as well through the development of identity spaces and student workspaces.

IMA's study programmes are an attractive choice for national and international students with a strong background in their discipline. Effective recruitment, gender balance and follow-up of students ensure low drop-out rates and high completion rates. Our graduates are sought-after in working life and well qualified for a long professional career in a dynamic job market – both nationally and internationally. Our continuing and further education programmes will provide society with greater expertise within our subject areas.

The learning environment at IMA is characterized by close cooperation between students and effective cooperation between teaching staff and students. This is achieved through good organization of learning spaces, clear expectations of the students, close follow-up throughout the period of study, as well as relevant learning activities and forms of assessment.

## CHOICES OF DIRECTION

### IMA will:

**Use** forward-looking technologies in teaching and introduce learning methods with active student involvement, digital teaching aids and varied forms of evaluation.

**Provide** relevant laboratory teaching of high quality.

**Work** actively with student recruitment.

**Pre-qualify** universities in other countries and facilitate international student exchange in other ways.

**Continuously** evaluate the courses included in the programmes of study to ensure their relevance to industry and society, as well as to improve students' learning outcomes.

**Develop** and manage relevant programmes in continuing and further education within our fields of expertise.

# OUR RESEARCH

IMA's research should meet the needs of society for new competence in our fields of expertise. We aim to help solve major challenges in Norway and worldwide. We will strive to make our research, our research data and dissemination available to all.

Research in the university sector takes place to an ever-increasing extent through large programmes under the Research Council of Norway and the EU. We will continue our commitment to the large programmes, and we will be involved in influencing calls for proposals.

Further strengthening of our research groups is an important part of IMA's research strategy. We will create a basis for our existing elite environments to maintain their position, and our ambition is that at least two of our fields of research will be at a high international level. We will continue to develop cooperation with strategically selected partners, both nationally and internationally.

One of IMA's advantages in competition with international research communities is our modern scientific equipment and specialized research laboratories. These must be developed further and managed effectively. IMA will strengthen modelling and simulation. We will use large-scale infrastructure both nationally and internationally and we will offer the use of our laboratories to visiting scholars and others who wish to use them.

IMA will continue its well-functioning collaboration with Norwegian and international research organizations as well as business and industry. In the future, SINTEF will continue to be the Department's closest research partner in Norway. We strive for a favourable balance between fundamental and applied research.

## GOALS

### IMA will:

**Develop** materials, processes, concepts and components for finding solutions to challenges in energy, the environment, climate and health, and develop knowledge for future generations.

**Contribute** to the development of Norwegian and international business through research on industrial challenges, both in collaboration with established enterprises and as a platform for new business.

**Make** our mark in competition for the scientific excellence programmes from the Research Council of Norway and the EU. Our research groups should be recognized and attractive partners in interdisciplinary research projects.

**Document** the quality of our research through publishing in internationally recognized journals, contributions to conferences, participation in national and international research programmes, invited lectures at international conferences, as well as evaluation of our PhD candidates by recognized external opponents.

## CHOICES OF DIRECTION

### IMA will:

**Support** and encourage research of high quality to strengthen academic communities that have the potential to reach a documented high international level.

**Develop** strategic national and international networks through participation in projects, collaboration with industry, conferences and other forums, as well as the use of sabbaticals. IMA will contribute to increased international collaboration by encouraging the exchange of PhD students and researchers.

**Seek** leadership of large national and international research projects and centres. Professional support services will be offered for such initiatives in collaboration with the rest of NTNU.

**Strengthen** our laboratories and develop the interaction between experimental research, theory and modelling.

# OUR ACTIVITIES IN INNOVATION



Photo: Geir Mogen

## GOALS

### IMA will:

**Facilitate** the development of new technology for sustainable innovation in existing and embryonic business and in the public sectors.

**Be** a preferred partner for innovation within the Department's subject areas regionally and nationally, and simultaneously be prominent within selected areas internationally.

**Educate** graduates with training and experience in innovation that will benefit society

## CHOICES OF DIRECTION

### IMA will:

**Consolidate** and strengthen the extent of our external relations.

**Improve** existing products and processes in collaboration with existing business and industry.

**Facilitate** start-ups through research and innovation.

In cooperation with our contacts in business and industry, IMA will contribute to national and international innovation by finding solutions to challenges in materials science and engineering. The Department will help to strengthen competence in society through education and continuing education of innovative and skilled graduates, and through the translation of research results into commercial products and services.

IMA's academic communities will be active in innovation. Through their work, our staff and students will contribute to innovative improvements in products and processes both in collaboration with existing business and industry and through establishing new enterprises.

# OUR DISSEMINATION AND OUTREACH



## GOALS

### IMA will:

**Spark** increased interest in our disciplines in society, and especially in how our expertise in materials can contribute to sustainable societal development.

**Disseminate** education, research and innovation to key audiences: the public, young people looking for places to study, the international science community and business.

**Showcase** our academic environments to strengthen the NTNU brand both nationally and internationally.

## CHOICES OF DIRECTION

### IMA will:

**Give** priority to initiatives directed at young people to increase their knowledge of materials science and engineering and ensure recruitment to our study programmes and disciplines.

**Use** the methods, the media and the arenas that are most in touch with our audiences. Digital media should be the primary communication channel for those who seek information about us.

**Contribute** to an NTNU identity that unifies students, employees and alumni through the use of NTNU as our overarching brand.

A vital part of IMA's social mission is to contribute to a knowledge-based society by providing the public with insight into and understanding of materials science and engineering as well as its importance. We will contribute to NTNU's visibility in the public debate about important questions and global challenges, and how research on and knowledge of materials can help to solve these.

Effective dissemination and communication strengthen IMA's reputation and the visibility of our academic communities. This can in turn help to recruit talented staff and students, and to make us an attractive partner for business and knowledge institutions.

# 03

## PRIORITY AREAS

INFRASTRUCTURE, LOCATION AND FACILITATION

INTERNATIONALIZATION

CAREER AND SKILLS

WORK AND STUDY ENVIRONMENT,

GENDER BALANCE AND DIVERSITY



## INFRASTRUCTURE, LOCATION AND FACILITATION

### GOALS

#### IMA will:

**Develop** infrastructure in the form of laboratories, scientific equipment and e-infrastructure that meets the needs of our core activities.

**Strive** for an optimal location of the Department, assembled in the same place to the greatest extent possible, facilitating academic development, well-being and interdisciplinary cooperation for students, employees and partners.

**Ensure** an optimal balance between academic, technical and administrative employees, and ensure optimal quality of our technical and administrative support services.

Laboratories and infrastructure are important pillars for the Department's activities. Strategic plans for procurement and operation of equipment and infrastructures form the basis for applications to various funding sources for equipment funding.

IMA has an appropriate and practical location. This helps us to realize synergies from the merger, and to achieve optimal cooperation within the Department as well as between students and academic communities.

A prerequisite for IMA to function well within our priority areas is that we have well-functioning support services through skilled and dedicated employees in administrative and technical positions. Appropriate capacity planning, competence, organizational structure as well as a well-functioning and inspiring work environment are prerequisites for achieving this.



Photo: Per Henning

## INTERNATIONALIZATION

### GOALS

#### IMA will:

**Increase** exploitation of the EU's measures to achieve international recognition, in addition to developing long-term collaborative relationships of high quality.

**Establish** and further develop strategic partnerships in research, education and innovation with selected institutions worldwide.

**Strengthen** international recruitment of outstanding researchers and increase the international mobility of our students and employees.

IMA will have an international focus, and internationalization will be integrated in the academic activity of all our expert communities.

IMA facilitates international mobility of our own students and staff, as well as the inclusion of visitors from industry and academia. Our participation at the forefront of international research results in high scientific quality.

An increasing proportion of IMA's research finds international funding and involves collaboration with international partners. Our broad international network of contacts and expertise makes IMA an attractive partner for companies that operate in global markets and in international work. og i det internasjonale arbeidslivet.

## CAREER AND SKILLS

### GOALS

#### IMA will:

**Strengthen** our active human resources policy emphasizing recruitment, enhancement of skills, and development of our employees.

**Pave** the way for the Department's employees to succeed in their own career, including encouraging and developing employees who want to take on management roles.

The Department's most important resource is our staff and students. IMA creates a platform for developing employees' skills to meet changing needs as well as the attributes, situation and aspirations of each employee. The Department's strategic human resource planning and development plans for each employee are important tools for realizing the strategy. The Department recruits the most talented staff and students in an international market.

## WORK AND STUDY ENVIRONMENT, GENDER BALANCE AND DIVERSITY:

### GOALS

#### IMA will:

**Ensure** that respect and generosity characterize our culture. Give priority to allocating time and resources to achieve this.

**Emphasize** gender balance, diversity and a multicultural work environment.

**Follow** up work environment surveys through good collaborative processes with a high level of participation and accountability.

**Have** a good, safe physical work environment in laboratories and offices, as well as a professional and well-functioning HSE culture.

**Provide** good supervision and create the basis for well-being and mastery for all our students.

IMA has motivated, dedicated and skilled employees and students. IMA creates the conditions for an attractive environment for work and study characterized by trust, generosity, high quality and a strong commitment to our work.

In particular, the Department wishes to emphasize gender balance and diversity, and aims to be a multicultural work environment with ample opportunity for everyone to realize their potential.

The study environment is important for IMA and the Department works in partnership with the students in this connection. Managers take a particular responsibility for the work environment and systematic efforts are made to promote health, safety and the environment. Employees and students are ensured opportunities to influence and participate actively in important processes through information channels, representative forums, permanent councils and committees, ad hoc committees and employee appraisal interviews.



