DEPARTMENT OF CHEMISTRY AND BIOSCIENCE

EXPLORING THE BUILDING BLOCKS OF LIFE

AALBORG UNIVERSITY

DEPARTMENT OF
CHEMISTRY AND BIOSCIENCE

REGIONAL, NATIONAL, AND GLOBAL

The Department of Chemistry and Bioscience advances regional, national, and global knowledge build-up, while contributing to the solution of societal challenges through state-of-the-art research, problem-based education, and knowledge-based collaborations. We produce world-class research in engineering and natural sciences through five specialist research areas: biotechnology, biology, environmental science, chemistry, and chemical engineering.

INNOVATING THE FUTURE

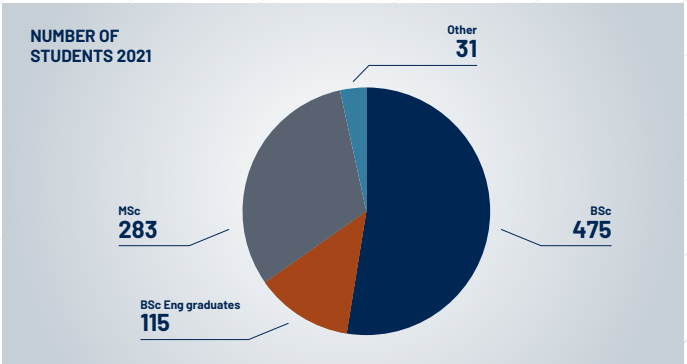
Through research-based teaching, we educate independent, collaboration-minded, and solution-oriented engineers and scientists on bachelor, master, and PhD levels. We promote innovation through knowledge-sharing and collaboration with public and private partners and based on the UN Sustainable Development Goals, we integrate sustainable considerations in all our activities. Thus we create knowledge at a high international level and are an attractive partner for other leading research environments and key players outside the University.

WORLD-CLASS INFRASTRUCTURE AND EXPERTISE

The Department of Chemistry and Bioscience holds a highly specialized infrastructure that allows our researchers to always stay ahead and be leaders in their field.

Furthermore, we believe that diversity is key to success and an inspiriring working environment. We benefit from a large number of high-profile research areas and high-profile individual researchers and due to this many projects at the Department have research themes and application areas that are interdisciplinary and multidisciplinary by nature.

This approach leads to state-of-the-art research recognized both nationally and internationally and impacts the development of new technologies and affects production methods and innovations in industries.



RESEARCH AREAS

RESEARCH AT THE DEPARTMENT OF CHEMISTRY AND BIOSCIENCE IS ORGANIZED IN THE FOLLOWING RESEARCH AREAS:

APPLIED SUPRAMOLECULAR CHEMISTRY

Applied Supramolecular Chemistry, combines basic research with applied chemistry to design new molecular structures allowing us to create new materials for a sustainable future and for advanced drug delivery systems designed for improved disease treatment. Underlying our approach is a basic understanding of molecular interactions, i.e. the complex interactions between molecules and subsequent knowledgebased applications. Our goal is a rational approach to design new structures with desirable properties. The key application areas include polymer-based photovoltaics, diagnostics, drug delivery, and cholesterol disorders.

CHEMICAL ENGINEERING

The Chemical Engineering Research Area is focused on chemical processes and their applications. The process focus allows for application within a wide range of fields, such as energy production and other production processes including purification and separation processes. Topics such as waste treatment and recovery of resources from waste to reduce environmental impacts as well as sustainable use of new resources and raw materials are also well within the scope of the research area.

DISORDERED MATERIALS

The Disordered Materials Research Area deals with the fundamental understanding and structure-property relations of glasses, glass fibers, and other types of disordered materials. Such knowledge is needed for developing the next generation of advanced disordered materials and relevant technologies. The area also deals with understanding of supercooled and equilibrium liquids as well as partially disordered systems such as glass-ceramics. Research within the highly interdisciplinary Disordered Materials area leads to new methodologies for both characterizations and processing of disordered materials. Another mission of the research area is to develop the new generation of disordered materials with superior properties and multi-functionalities for a sustainable society.

ENVIRONMENTAL BIOMONITORING

Environmental Biomonitoring, provides the knowledge and solutions needed to direct and ensure a sustainable future that preserves our environment for the coming generations. We cover a wide range of research actions, often multidisciplinary, within major focus areas such as wildlife disease surveillance, greenhouse- and trace gasses, microbial bio-geo-chemistry, water quality, freshwater biology, marine biology, environmental toxicology, environmental impact assessment and nature management.

Our work includes monitoring and understanding the relationship between nature management and ecosystem quality, biodiversity and tracing microbial activity associated with water treatment and energy production. We use a diverse range of both traditional and new technologies to address ecological questions, including population studies by bio acoustic recordings, thermal drones, high-resolution gas analysers, eDNA, metagenomics, metaproteomics, stable isotope probing, and advanced imaging.

ENVIRONMENTAL CHANGE AND ADAPTATION

The Environmental Change and Adaptation Research Area deals with the fundamental understanding of how genetic and plastic mechanisms shape adaptation of organisms to natural and anthropogenic environmental change, how evolutionary processes shape population genomics, interactions between animals, plants and pathogens, and the factors that impact on biodiversity at various scales.

MEDICAL BIOTECHNOLOGY

Medical Biotechnology, is the application of biotechnology that improves the daily lives of individuals. In the research area, we use state-of-the-art technologies to obtain knowledge applicable to the development of better diagnostics and therapeutics. In addition, we seek knowledge of fundamental biological systems, allowing better differentiation between disease and normal human development and health.

ENVIRONMENTAL MICROBIOLOGY

Environmental Microbiology, covers the study of microbial communities, interactions, and processes in the environment, both in engineered and natural systems. We work at the interface between microbial ecology and environmental biotechnology to develop microbial community management strategies for a sustainable future in the water sector including resource recovery, bioenergy production, and removal of pollutants. Furthermore, we have a strong focus on microbes in agriculture and the role of microbes in human health. We also develop novel technologies and approaches to study the diversity and activity of microbial "Dark Matter" (i.e. the unknown or undiscovered species) – with a special focus on the microbiome of Denmark and wastewater treatment plants and biogas reactors across the globe.

PLANT AND FUNGAL BIOTECHNOLOGY

In the Plant and Fungal Biotechnology Research Area, we deal with some of the most important challenges that the human civilization faces. On the plant side, we are addressing the accelerating food demand through a genomics approach to enhance yields in potatoes to create more robust plants. On the fungal side, we are using a suite of molecular tools and mycological techniques to novel compounds that can serve as drug leads to combat cancer and the rise in antibiotic resistance. To assist in the green transition, we are developing a battery based on fungal pigments, which can be used to store energy from renewable sources.

SEPARATION PROCESSES

The Separation Process Research Area deals with basic and applied research within design, operation, and theoretical understanding of separation processes. We synthesize and functionalize membranes, design membrane modules and test new membrane processes in lab and pilot scale. We study the application of separation processes for recovery of nutrients from waste streams, extraction and purification of proteins, harvesting of minerals from liquids, removal of micropollutants and reuse of organic solvents.

SUSTAINABLE BIORESOURCE TECHNOLOGY

In the Sustainable Bioresource Technology Research Area we focus on the sustainable use and protection of natural resources. We develop technologies associated with the conversion and production of bioresources, bioresource systems analysis, biotransformation, bioremediation as well as environmental protection. We develop biorefinery processes and look for solutions for biological waste treatment and valorization, microbial and photochemical degradation of micropollutants, plastics, and greenhouse gases and assess new ecofriendly materials. Microbial and enzymatic processes are investigated and developed to upcycle waste streams and residues into higher value products including biofuels, green chemicals, feed and food. The interdisciplinary research areas are important for the holistic understanding of sustainable use of bioresources. Hence, our overall strategy is an integrative approach where multiple disciplines are closely interacting to obtain deeper scientific insight and applied solutions promoting sustainability development.

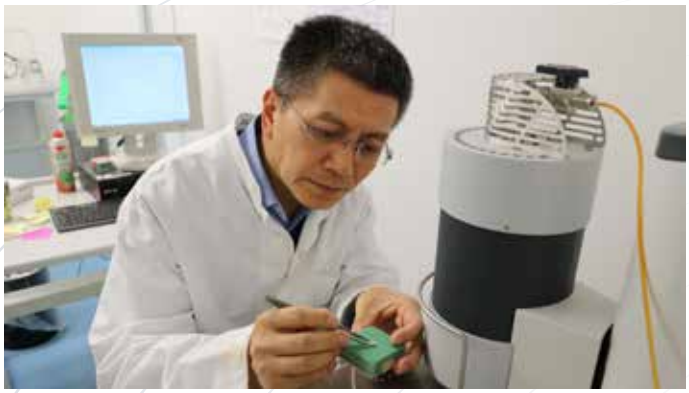
GROUNDBREAKING RESEARCH AT THE DEPARTMENT OF CHEMISTRY AND BIOSCIENCE



MICROFLORA DANICA

Identification of life is essential to our understanding of the world. Traditionally, the focus has been on objects we can recognize with our eyes, such as plants and animals. However, in the last decades it has become evident that microorganisms, small cells invisible to the naked eye, are involved in all aspects of our lives. From making us sick or keeping us healthy, to climate change and sustainable biotechnology production.

READ FULL STORY HERE



UPCYCLING OLD TV-SCREENS TO BRICKS FOR BUILDINGS

Yuanzheng Yue is a professor at the Department of Chemistry & Bioscience. He is considered to be one of the leading glass researchers in the world. More than a decade ago, he discussed with a student whether the glass from old large-screen TVs could be recycled. They were found in abundance in recycling centers as flatscreen televisions and computer monitors gained popularity. It was the start of a new adventure, where the AAU researcher, a number of bachelor's, master's and PhD students allied themselves with Matzen Teglværk and produced a brick for the building industry.

READ FULL STORY HERE

SECTION	CAMPUS	BACHELOR'S PROGRAMMES	MASTER'S PROGRAMMES
Bioscience and Engineering	AALBORG	Biotechnology (Bachelor of Science in Engineering)	Biotechnology - Medical Biotechnology (Cand. Polyt.)
		Biology (Bachelor of Science)	Biology (Cand. Scient.)
		Environmental Science (Bachelor of Science in Engineering)	Environmental Science (Cand. Tech.)
Chemical Science and Engineering		Chemistry (Bachelor of Science)	Chemistry (Cand. Scient.)
		Chemical Technology (Bachelor of Science in Engineering)	Chemistry (Cand. Polyt.)
Bioscience and Engineering and Chemical Science and Engineering		Chemistry and Biotechnology (Bachelor of Engineering) - Environmental Engineering - Biotechnology - Chemistry	
	ESBJERG	Chemical Engineering and Biotechnology (Bachelor of Science in Engineering)	Chemical Engineering - Oil and Gas Technology (Cand. Polyt.)
			Bioengineering (Cand. Polyt.)
		Chemical Engineering and Biotechnology (Bachelor of Engineering)	

Solutions to make a difference

- to the planet, humanity and the environment

Alfa Laval welcome interns who wish to build their career with us every year.

Alfa Laval's membrane systems are used within a wide range of industries – mainly Biotech & Pharma, Food & Beverage as well as Water & Waste treatment. Our international team is committed to developing young professionals in an innovative work environment by providing opportunities to explore the practical applications of their studies to navigate the engineering market. Students become involved in the entire process from the first day to train and boost their skills.

Alfa Laval is the perfect environment for creative freedom; they know that innovative solutions are vital to reach their ambitious sustainability goals and revolutionize the industry.

Søren Villumsen, Chemical Engineer, AAU Alumni & Data Scientist, Alfa Laval

At Alfa Laval, you get a chance to implement your ideas, share your experience, and be inspired by dedicated high-profile experts. Creating tomorrow together gives me a feeling of belonging, and I am encouraged to take actions that affect myself and society

Justyna Szczepańska, Development Engineer, AAU Alumni

Alfa Laval is eager to receive young professionals who share our vision to create better everyday conditions for people through innovative products and solutions. Therefore, we collaborate with universities to find candidates keen to support our strategy through their research projects.

Alfa Laval's expertise with crossflow membrane filtration builds on more than 50 years of experience.

Learn more at: alfalaval.com/membranes

Scan and see our video

CONTACT

DEPARTMENT OF
CHEMISTRY AND BIOSCIENCE

FREDRIK BAJERS VEJ 7H
9220 AALBORG Ø

NIELS BOHRS VEJ 8
6700 ESBJERG

TEL.: + 45 99 40 31 87
CONTACT@BIO.AAU.DK

WWW.BIO.AAU.DK

AALBORG
UNIVERSITY

DEPARTMENT OF
CHEMISTRY AND BIOSCIENCE

JS DANMARK • Concept: JS MEDIA TOOLS A/S • 18410 • www.jsdanmark.dk