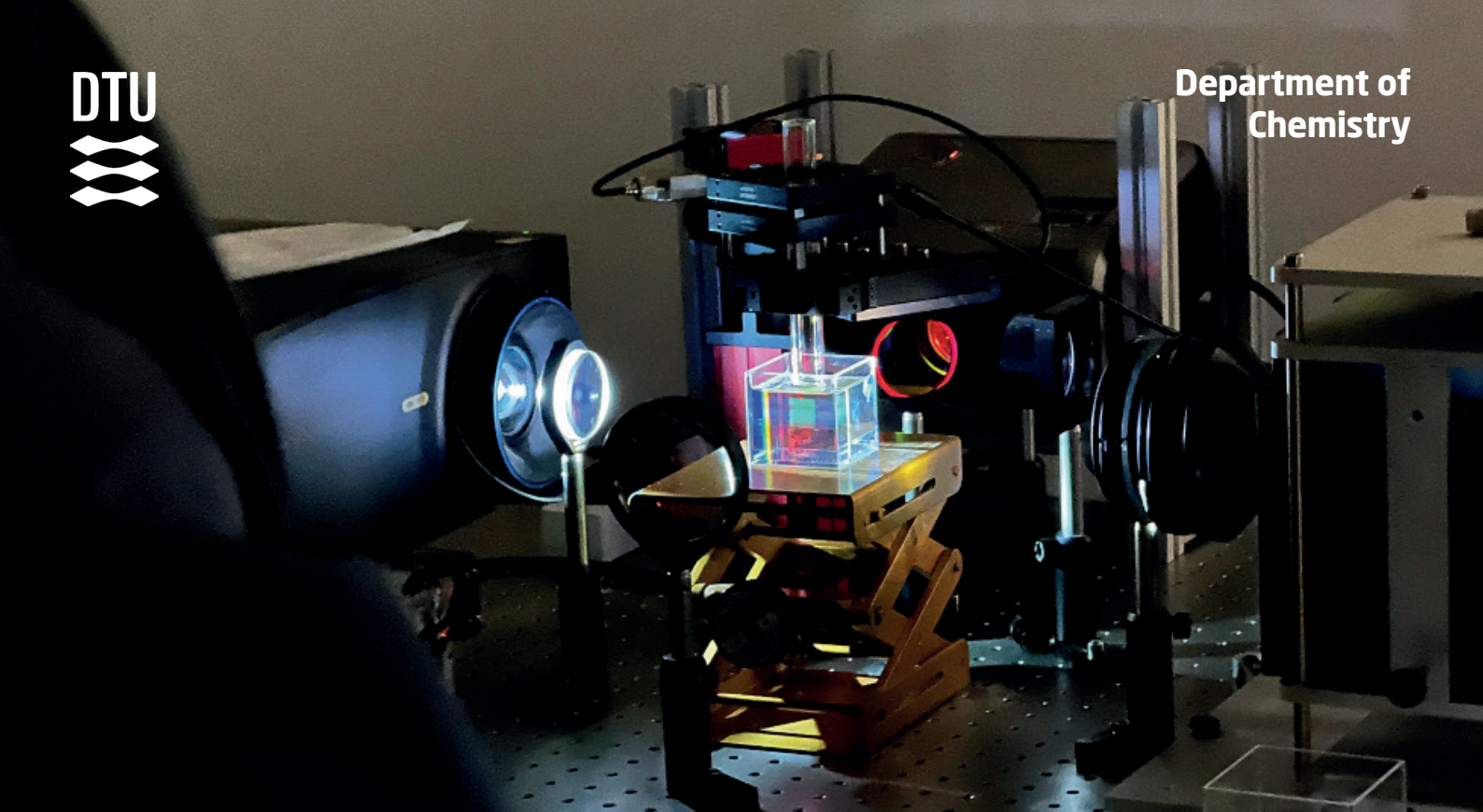




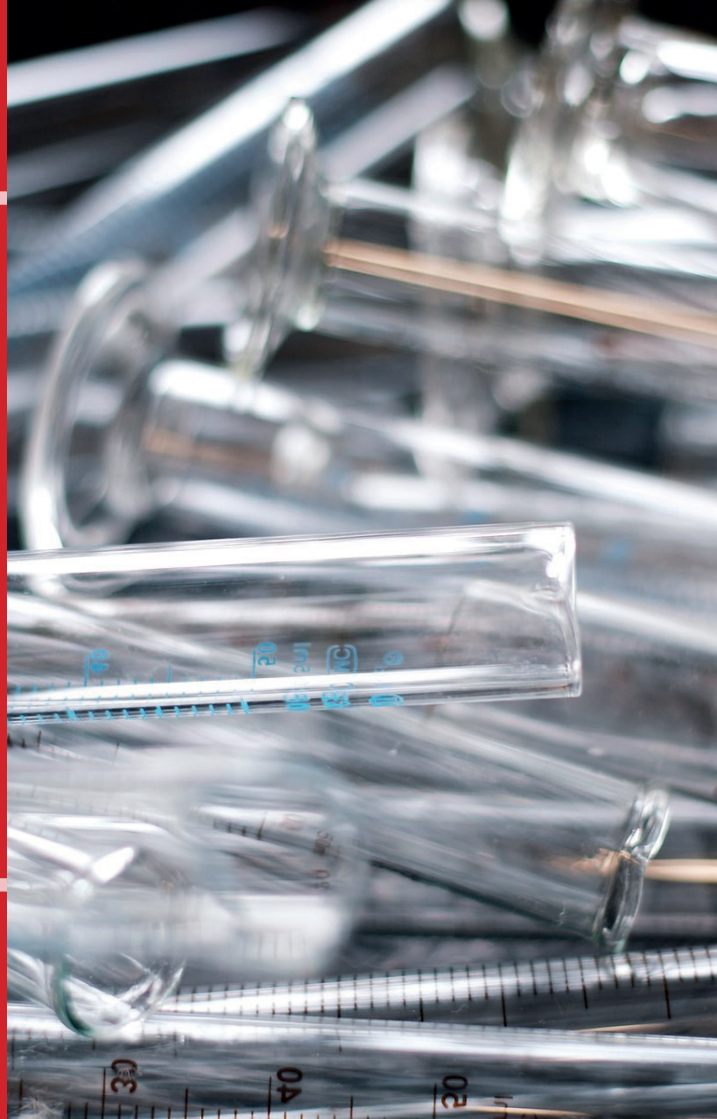
Department of  
Chemistry



**DTU Chemistry**  
**2022**

# Contents

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# Chemistry holds the key to solving global challenges

Chemistry plays a central role in many of the solutions to solve global challenges. Chemistry is a vital factor in establishing a future sustainable society - for instance as a foundation for the green transition and development of new materials. We also use chemistry in life science for developing vaccines for life-threatening diseases and with quantum chemistry, we now have the opportunity to develop new methods for simulating complex chemical systems.

Chemistry is also a matter of course when working with carbon capture, utilization and storage of CO<sub>2</sub> (CCUS). Therefore, several of the DTU Chemistry researchers are involved in the interdisciplinary green partnership INNO-CCUS.

With the development of quantum computers, quantum chemistry now has immense potential. We are grateful for receiving a new grant from the Novo Nordisk Foundation supporting a large project, which will create knowledge and develop methods to use the exceptional computing power of the quantum computer to conduct quantum chemical calculations of molecular properties.

Life science is central to identifying, understanding and treating diseases. Among others, we have received grants for developing new methods of introducing drugs into the brain - thereby contributing to the treatment of brain diseases.



Head of Department, Erling H. Stenby

Photo: Bax Lindhardt

Another project at DTU Chemistry harnesses the fact that cancer cells have specific complex carbohydrates on their surface to develop vaccines for cancer treatment.

Likewise, the education at DTU Chemistry is an investment in the future. Every year, new skilful candidates graduate - the majority finds employment in the industry, and we see an increasing demand for our students.

At DTU Chemistry, we look forward to a new year and to continue to offer innovative ideas and solutions to the benefit of society.

Head of Department,  
Erling H. Stenby

# Two major research sections

The research sections of DTU Chemistry contribute through different methods to new knowledge and solutions in areas such as new medicine, clean energy technologies, and new sustainable materials for the benefit of people and environment.

## Organic and Inorganic Chemistry

This section is developing effective compounds by comprising activities within catalysis and sustainable chemistry, materials chemistry, and organic chemistry.

Common themes are the synthesis and characterization of small to very large inorganic and organic molecules.

Research areas are homogenous and heterogeneous catalysis; gas separation and absorption; development of new materials; conversion of biomass; electrochemistry; new synthetic methods; coordination chemistry; chemical biology; NMR spectroscopy.

## Physical and Biophysical Chemistry

This section comprises activities within pure and applied physical chemistry. It covers both microscopic atomic-level descriptions and the macroscopic thermodynamic approach.

Common themes are determination of structure and behaviour of small to medium-sized molecules as well as proteins, and many projects involve spectroscopy, scattering, and computer modelling.

Research areas are biophysical and biomedical chemistry; high pressure phase behaviour for petroleum processing and CO<sub>2</sub> sequestration; polymers and functional interfaces; IR and THz spectroscopy; theoretical, computational, and femtochemistry.

# Research in figures



138

Publications in 2022  
WoS-indexed journals



26 faculty

28 postdocs  
4 researchers and  
senior researchers



1.19

Normalized citation impact

12.7%

Publications in top 10%



29

BEng, BSc, and MSc projects  
completed with industry



31

WoS publications in  
cooperation with industry



87 MDKK

in external funding



## **Novo Nordisk Foundation NERD grant goes to Professor Kristoffer Almdal**

The Novo Nordisk Foundation has granted 14 MDKK to Professor Kristoffer Almdal through the New Exploratory Research and Discovery (NERD) programme. Kristoffer Almdal receives the new and prestigious grant for his ambitious project: *Packing Frustration in ABC Starblock Polymers*.

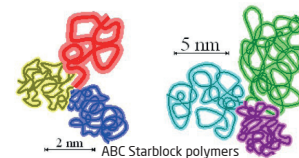
The ABCstar project will significantly advance the understanding of self-organization in soft matter by investigating systems that contain a designed clash between the different parameters governing the system.

This fundamental understanding of self-organizing will impact the understanding of soft and biomolecular matter. Biological structures such as cell membranes and biofilms are self-organized. Thus, the project can open routes to new drugs and applications within this area.

The purpose of the NERD programme is to support creative, daring, and ambitious researchers within original basic research in natural and technical sciences, including but not limited to physics, chemistry, mathematics and computer science.

The grant is aimed at supporting a single principal investigator (PI) with ample funding and a long time horizon of 7 years, providing the required long-term stability and continuity to explore truly exceptional ideas with potential impact within the life sciences, health sciences or biotechnology.

Kristoffer Almdal is the PI of the 7-year long project that takes place at DTU Chemistry in collaboration with colleagues from the University of Copenhagen and Roskilde University.





## 40 MDKK for quantum chemistry on quantum computers

Professor Sonia Coriani from DTU Chemistry is one of the partners in a research project between the University of Copenhagen, DTU, and the University of Southern Denmark, which has received 40 MDKK from the Novo Nordisk Foundation to develop quantum chemical calculation methods for quantum computers.

In the research project Hybrid Quantum Chemistry on Hybrid Quantum Computers, Professor Sonia Coriani, Professor Stephan Sauer (UCPH) and Professor Jacob Kongsted (SDU) will work closely together to solve some of the major challenges inherent in developing quantum chemical algorithms and tools to enable the calculation of molecular properties of biological systems - such as metalloenzymes and light-harvesting chromophores in proteins—on hybrid classical-quantum NISQ (noisy intermediate-scale quantum) systems.

## Associate Professor Luca Laraia receives the prestigious ERC starting grant

Cholesterol transport proteins (CTPs) regulate cellular metabolism, hormone biosynthesis, and organelle contacts, with profound consequences for human health and disease. In the project Chemical Biology of Intracellular Cholesterol Transport optimised CTP inhibitors will be used to determine how CTPs mediate lipid metabolism and trafficking, and their effect on sterol-mediated processes with potential applications in neurodegenerative disorders and cancer.

A general approach for modulating is ground-breaking and will have impact beyond this set of proteins by providing a blueprint for studying and targeting other families of lipid-binding proteins in the future.

The European Research Council has granted 11.2 MDKK which will be spent on expanding Luca Laraia's research.



## Funding of 9.9 MDKK to Associate Professor Wei Yan

Associate Professor Wei Yan has received 9.9 MDKK from INNO-CCUS and Totalenergies, Noreco and Ineos. The project *Compositional Simulation of Reactive Transport in CO<sub>2</sub> Storage* will advance the simulation technology for geological CO<sub>2</sub> storage and build the state-of-the-art simulator that can be used for evaluating both the injection and the postinjection periods. The project directly contributes to the de-risking of CO<sub>2</sub> injection into different types of reservoirs, helping an early decision on the implementation of CO<sub>2</sub> storage.

The INNO-CCUS Partnership is established with support from Innovation Fund Denmark as a mean to secure a significant contribution to achieve the Danish government's climate goals on CO<sub>2</sub> reduction, through CCUS solutions.

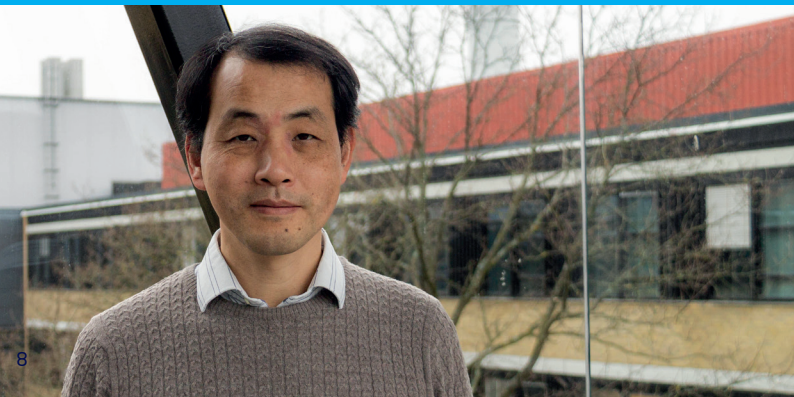


Photo: The Independent Research Fund Denmark

## Sapere Aude Grant to Associate Professor Janus Juul Eriksen

The Independent Research Fund Denmark has granted 6.2 MDKK to Associate Professor Janus Juul Eriksen through the Sapere Aude programme for younger research leaders who have delivered excellent research within their field.

Janus Juul Eriksen receives the prestigious grant for the project *FESCOPE: Focused Simulations of Electronic Structure in Composite Phases*. The project is focuses on innovative new means of complementing experimental investigations of electronic transitions through the development of novel simulation tools capable of advancing on chemical studies within both solutions and biomolecular systems at an unprecedented efficiency.



# Two Villum Young Investigators upgraded to YIP+

Associate Professor Sophie Beeren and Professor Kasper Steen Pedersen have each received extension grants from the Villum Young Investigator Programme (YIP) of 4 MDKK.

Sophie Beeren will investigate how recognition between molecules can be used to change the outcome of enzymatic processes and obtain new and complex biomolecular structures not usually seen in nature.

Kasper Steen Pedersen will design electrically conductive molecular frameworks incorporating rare earth magnets - a new materials class that allows for quantum-coherent manipulation of spin-polarized currents.



# Other notable funding

## Independent Research Fund Denmark

- Sebastian Meier, *Part of the solution: solvation effects and the superior formation of bio-sourced products*, 2.9 MDKK
- Susanne Mossin, *Spectroscopy of molybdenum sulfide catalysts, from clusters to layers*, 2.9 MDKK
- Robert Madsen, *Photocatalytic Reactions of Alcohols with Earth-Abundant Metal Catalysts*, 2.9 MDKK

## Villum Foundation

- Kaibo Zheng, *Engineering of covalent organic framework based hybrid photocatalysts for efficient CO<sub>2</sub> to fuel conversion*, 2 MDKK

## Horizon Europe - Research Infrastructure

- Mads H. Clausen, *From fragments to high affinity binders interfacing integrated structural biology, medicinal chemistry and artificial intelligence (Fragment-Screen)*, 1.6 MDKK

## Innovation Fund Denmark

- Wei Yan, *DemoBECCS The Potential and Demonstration Feasibility of Bioenergy with Carbon Capture and Storage*, 1.85 MDKK
- Katrine Qvortrup, *Targeting Nature's Gatekeeper for Improved Drug Delivery to the Brain*, 1.5 MDKK
- Anders Riisager, *Carbon capture Open tests and Review of Technologies*, 0.8 MDKK
- Kristoffer Almdal, *Circularity of Industrial Thermoplastic for high quality recycling*, 0.6 MDKK
- Wei Yan, *THERMOCO2WELL - Risk Assessment of the CO<sub>2</sub> Injection Well Damage due to Thermal Stresses*, 0.5 MDKK

## Novo Nordisk Foundation

- Mads H. Clausen, *Developing a new class of inhibitors for oncoribosomes*, 1.4 MDKK

## Carlsberg - Research Infrastructure

- Mads H. Clausen, *Equipment for synthetic carbohydrate chemistry*, 0.4 MDKK

# Two new Full Professors in Inorganic Chemistry

Kasper Steen Pedersen and Søren Kegnæs have been appointed Full Professors in Inorganic Chemistry

## Kasper Steen Pedersen

Kasper was employed as Assistant Professor at DTU Chemistry in 2017.

He is using synthetic chemistry to target problems in the interface between chemistry, physics, nanoscience, and materials science.

His research activities are broadly devoted to the exploitation of new physical phenomena in metal-organic framework (MOF) materials, although with a particular focus on the design, synthesis, and characterization of MOFs featuring excellent electronic, photonic, magnetic, and thermal properties.

Kasper has a strong interdisciplinary profile and collaborates with many Danish and foreign colleagues. He has an inspiring approach to research-based teaching and is a role model for future engineers.



## Søren Kegnæs

Søren Kegnæs has been Professor MSO since Dec 2017.

He conducts research within design of functional nano-materials, their characterization and application in heterogeneous catalysis.

His research activities focus on the fundamental aspects of materials synthesis and catalysis in relation to the industrial production of chemicals. A specific focus is on synthesizing nanoparticles, zeolites, nanostructures, and high surface area materials with controlled porosity.

Søren is the Head of Innovation at DTU Chemistry. He collaborates closely with the industry with great benefit to DTU Chemistry.



# Selected publications

DTU Chemistry has a high performance in the world of chemical science. This is reflected in all the publications produced and published in high impact journals every year.

In the following pages, you can read some examples of the Department's exciting results and publications during 2022.

For a complete list, scan the code or visit:

[kemi.dtu.dk/english/aboutus/publications](https://kemi.dtu.dk/english/aboutus/publications)



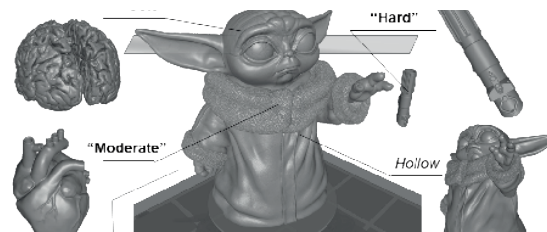
Read the complete list

## Opportunities for production of artificial multiscale structures

A team of researchers from across the Department, including Senior Researcher Saeed Z. Moghaddam, Professor Esben Thormann, Professor Kristoffer Almdal and Assistant Professor Yi Yang, report exciting opportunities for production of artificial multiscale structures, with potential to break grounds in rapid manufacturing of branching networks such as vascular trees.

The article describes the development of a new 3D printing technology based on light with unprecedented speed and first in the world property modulation with orthogonal photochemistry.

Title: *Stiffness control in dual color tomographic volumetric 3D printing.*



Published in Nature Communications

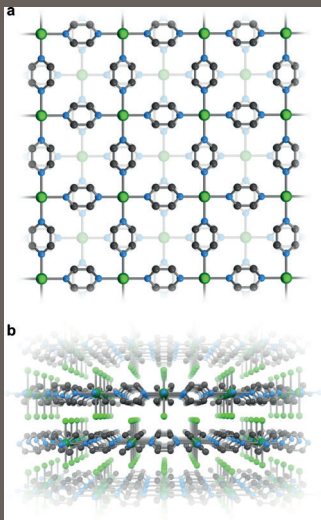
DOI: 10.1038/s41467-022-28013-4

Read the full article

# The existence of correlated Fermi metallicity in molecular materials

DTU Chemistry's former PhD student Laura Voigt, Dr. Mariusz Kubus and Professor Kasper S. Pedersen report, together with colleagues, on the existence of correlated Fermi metallicity in a 2D solid en route to novel superconductors and quantum materials.

Title: *From an antiferromagnetic insulator to a strongly correlated metal in square-lattice  $MCl_2(\text{pyrazine})_2$  coordination solids.*



Published in Nature Communications

<https://doi.org/10.1038/s41467-022-33342-5>

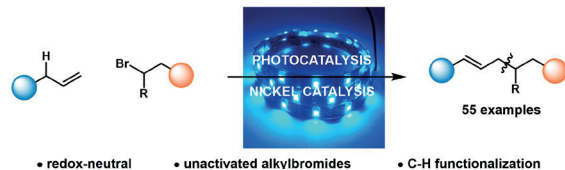
Read the full article

# The development of a new reaction using homogeneous photocatalysis

Collaborative work between the research groups of Associate Professor Søren Kramer, Professor Søren Kegnæs and PhD student Mikkel B. Buendia (DTU Chemistry), and Professor Ruben Martin and Postdoc Bradley Higginson (Institute of Chemical Research of Catalonia) has been published in ACS Catalysis.

The publication describes the development of a new reaction using homogeneous photocatalysis. Specifically, a new  $sp^3$  C-H alkylation of olefins enabled by dual nickel and photocatalysis is reported. This method utilizes readily available olefins and it displays excellent site-selectivity as well as broad substrate scope.

Title: *“Redox-Neutral Ni-Catalyzed  $sp^3$  C-H Alkylation of  $\alpha$ -Olefins with Unactivated Alkyl Bromides”*



Published in ACS Catalysis

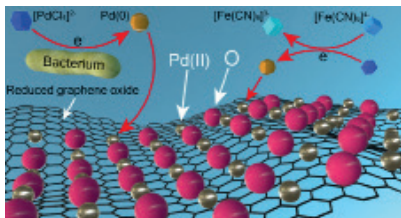
<https://doi.org/10.1021/acscatal.2c01057>

Read the full article

## An entirely new palladium oxide structure by microbial biosynthesis

Emeritus Professor Jens Ulstrup, Senior Researcher Christian Engelbrekt and Researcher Xinxin Xiao from the NanoChemistry Group have discovered and developed an entirely new palladium oxide structure by microbial biosynthesis.

A novel and square 2D PdO/reduced graphene oxide (rGO) nanofilm is formed when dissolved Pd(0) reacts with graphene oxide. A silver oxide with a similar crystal structure is obtained from an analogous synthesis, suggesting that a whole new class of metal oxide/rGO layers is created.



Title: *Synthesis and Structure of a Two-Dimensional Palladium Oxide Network on Reduced Graphene Oxide.*



Read the full article

Published in Nano Letters

<https://doi.org/10.1021/acs.nanolett.2c01226>

## The site of oxidation has a profound impact on target selectivity of oxysterols

Postdoc Cecilia Rossetti and Associate Professor Luca Laraia mapped the oxysterol interactome with three A- and B-ring oxidized sterols as well as 25-hydroxy cholesterol using thermal proteome profiling, validating selected targets with the cellular thermal shift assay and isothermal dose response fingerprinting.

This revealed that the site of oxidation has a profound impact on target selectivity, with each oxysterol possessing an almost unique set of target proteins. Overall, targets clustered in pathways relating to vesicular transport and phosphoinositide metabolism, suggesting that while individual oxysterols bind to a unique set of proteins, the processes they modulate are highly interconnected.

Title: *Thermal Proteome Profiling Reveals Distinct Target Selectivity for Differentially Oxidized Oxysterols.*



Read the full article

Published in the ACS Chemical Biology

<https://doi.org/10.1021/acscchembio.2c00383>

## The cover of The Journal of Chemical Physics

In an international collaboration involving more than ten academic institutions and large-scale free-electron x-ray laser facilities, Professor Klaus B. Møller, Associate Professor Niels E. Henriksen, and other DTU colleagues have combined computer simulations and ultrafast x-ray experiments to investigate some of the most fundamental chemical processes.

The article shows how this combination of technologies can track in real time with atomic-scale resolution both the solute dynamics and the accompanying reorganization in a photoinduced charge-transfer reaction.

Title: “Tracking structural solvent reorganization and recombination dynamics following  $e^-$  photoabstraction from aqueous  $I^-$  with femtosecond x-ray spectroscopy and scattering”.

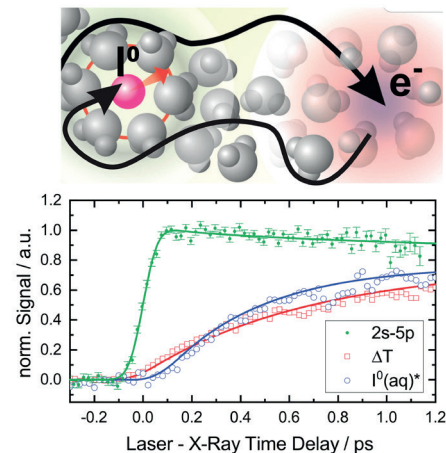


Read the full article

Published in Journal of Chemical Physics  
<https://doi.org/10.1063/5.0107224>



The Journal  
of Chemical Physics



Volume 157, Issue 22, 14 Dec. 2022

### Tracking structural solvent reorganization and recombination dynamics following $e^-$ photoabstraction from aqueous $I^-$ with femtosecond x-ray spectroscopy and scattering

J. Chem. Phys. **157**, 224201 (2022); doi.org/10.1063/5.0107224

Peter Vester, Katharina Kubicek, Roberto Alonso-Mori, Tadesse Assefa, Elisa Biasin, Morten Christensen, Asmus O. Dohn, Tim B. van Driel, Andreas Galler, Wojciech Gawelda, Tobias C. B. Harlang, Niels E. Henriksen, Kasper S. Kjær, Thomas S. Kuhlman, Zoltán Németh, Zhanatay Nurekeyev, Máttyás Pápai, Jochen Rittman, György Vankó, Hasan Yavas, Diana B. Zederkof, Uwe Bergmann, Martin M. Nielsen, Klaus B. Møller, Kristoffer Haldrup, and Christian Bressler



# Innovation

Innovation is an important part of the work of DTU Chemistry.

In 2022, we had 14 ongoing innovative projects with commercialisation potential. The projects focus on green transition, life science, and materials science and development.

In 2022:

- 13 have received Innovation Enabling Grants for a total value of 4.8 MDKK
- 11 have reported Notifications of Invention
- 3 have been commercialised



## Student innovation

At DTU, innovation and entrepreneurship are integrated into our study programmes, mandatory courses, and electives. Through projects, events, internships, and student jobs, students gain experience within the business community, which ensures that students develop entrepreneurial competences and that, in turn, companies benefit from innovative inputs from the students.

## Business collaboration

DTU has a strong tradition for working with companies and has a wide range of collaborations regarding strategic research collaborations, continuing education, student projects, conferences, etc. In 2022, DTU Chemistry had nine signed collaborative research projects with public and private companies. The interaction between the university and the business community enables theory to be put into practice and that research is based on real-world issues.



**Collaboration with industry:** Together with Novo Nordisk, PhD student Emilie Stubkjær Lassen is working with synthetic peptide analogues as targeting and endosomal guiding reagents for gene therapy of autoimmune diseases.

## Join us

Are you interested in cooperating with DTU Chemistry?  
Find the right contact person at [kemi.dtu.dk/english/aboutus/contact](https://kemi.dtu.dk/english/aboutus/contact)

# PhD School

## PhD from DTU Chemistry

DTU Chemistry takes pride in educating PhDs at the highest international level. We offer a diverse research education in modern chemistry, which contributes to the development of cutting-edge science at the department. The goal for all PhD students is to publish in leading journals and participate in leading international conferences during their three-year long research education.

## Power Performance

Excellent scientists must also be able to communicate their research results efficiently. Therefore, DTU Chemistry offers all PhD students an intensive communication course (1.5 ECTS) to practice their presentation techniques to perfection. A cornerstone in this regard is the annual PhD Symposium at which stakeholders from the industry are invited to attend both oral presentations and a poster session by the Department's PhD students.

## Contact us

On the following page, you can get acquainted with the DTU Chemistry PhD Defences of 2022. All supervisors invite you to get in touch, if you are interested in the full thesis, in further information, or in a possible collaboration.



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**24**

**Completed PhDs in 2022**

**19**

**PhDs admitted in 2022**





## **Amalie Nørskov**

*Advanced Bioconjugation Technologies: A Dual-drug Candidate for Treatment of Type-2 Diabetes*  
Supervisor: Katrine Qvortrup

## **Charlotte Nybro Dansholm**

*Phosphorylase-mediated dynamic combinatorial chemistry with linear  $\alpha$ -1,4-glucans*  
Supervisor: Sophie Beeren

## **Charlotte Uldahl Jansen**

*A Novel Site-Selective Bioconjugation Strategy for the Synthesis of Energy Harvesting Protein-Conjugates*  
Supervisor: Katrine Qvortrup

## **Daniil Fedotov**

*Development and Application of Second-Order Methods for UV-VIS Spectroscopy of Organic Molecules*  
Supervisor: Sonia Coriani

## **Faliu Yang**

*Single-Atom Porous Organic Polymer Catalysts for Asymmetric Catalysis*  
Supervisor: Søren Kegnæs

## **Fangyuan Diao**

*Prussian Blue Analogues and Their Derivatives for Water Splitting Reactions*  
Supervisor: Rene Wugt Larsen

## **Fernando De Azevedo Medeiros**

*Chemical and Phase Equilibrium Simulation Tools for Underground Storage of CO<sub>2</sub>*  
Supervisor: Wei Yan

## **Hua Chen**

*Exploration of Archimedean Tessellations in Metal Organic Frameworks*  
Supervisor: Søren Kegnæs

## **Ida Marie Vedel**

*Mapping L-phenylalanine binding to the regulatory domains of human tryptophan hydroxylase isoforms*  
Supervisor: Günther Peters

## **Kai Gao**

*Production of 1,3-butadiene from ethanol using zeolite-based catalysts*  
Supervisor: Søren Kegnæs

## **Katja Egeskov Grier**

*Advanced Bioconjugation Technologies for Site-selective Protein Modification: Antibody Drug Conjugates*  
Supervisor: Katrine Qvortrup

## **Katja Desiree Pedersen**

*Novel approaches to absolute structure*  
Supervisor: Charlotte Gotfredsen

## **Luca Piccirilli**

*Exploring the reactivity of Ru-PNP complexes in ionic liquids for small molecule transformations*  
Supervisor: Martin Nielsen

## **Mathias Thor Nielsen**

*Multimetallic organometallic complexes: in pursuit of novel dinuclear complexes bearing N N-heterocyclic carbene ligands*  
Supervisor: Martin Nielsen

## **Mike Steffen Bernhard Jørgensen**

*Structure-Activity Relationships in Catalyst Design*  
Supervisor: Martin Nielsen

## **Mikkel Krell-Jørgensen**

*Strategies towards Redshifted Hemithioindigo Photoswitches & Development of a Semi-Automated Photochemical Screening Platform*  
Supervisor: Luca Laraia

## **Ping Zhu**

*Enhancing the Catalytic Performance of Zeolites for Aldose-Ketose Sugar Transformations*  
Supervisor: Anders Riisager

## **Robert Andrew Biro**

*An examination of the anti-icing mechanisms of charged polymer coatings*  
Supervisor: Esben Thormann

## **Runtian Qie**

*Design of coatings and adhesives inspired by natural mussel glue*  
Supervisor: Esben Thormann

## **Sakhitha Koranchalil**

*Homogeneous Catalysis for the Sustainable Valorization of Biomass*  
Supervisor: Martin Nielsen

## **Sol Laura Gutiérrez Alvarez**

*Morphological effects on CsPbBr<sub>3</sub> Perovskite Nanocrystals: Photophysics From Nano to Micro*  
Supervisor: Kaibo Zheng

## **Thomas Whitmarsh-Everiss**

*Synthesis, identification, and biological characterization of sterol transport protein inhibitors*  
Supervisor: Luca Laraia

## **Weiguang Jin**

*Supramolecular Cages for Drug Delivery: RNA Stabilization and Delivery Using MOCS- and MOFs-based Nanostructures*  
Supervisor: Kira Astakhova

## **Zhenwei Ni**

*Exploring novel catalytic transformations of bioalcohols and mechanistic studies using Ru-PNP complexes*  
Supervisor: Martin Nielsen

# Alliances and strategic partnerships

As part of our ambition to extend international collaboration, we have succeeded in getting more PhD Alliance Scholarships with leading technical universities in Europe.

DTU's formalized strategic alliances, the Nordic Five Tech and the EuroTech Universities Alliance, have provided DTU Chemistry with 8 PhD scholarships.

**Anders Riisager, Robert Madsen** and **Esben Thormann** each have a PhD collaboration with KTH in Stockholm and **Sonia Coriani** collaborates with NTNU in Trondheim.

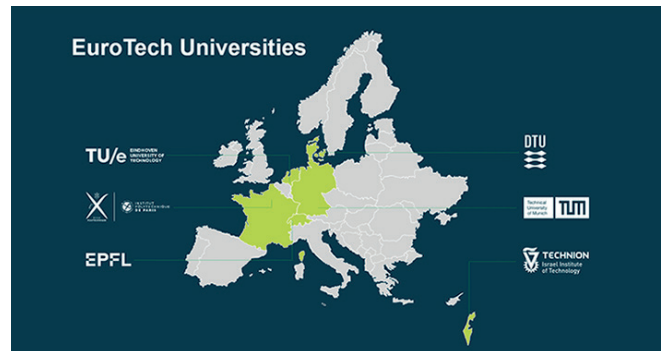
In addition, **Kira Astakhova** and **Kasper Steen Pedersen** each have a PhD collaboration with Ecole Polytechnique in Paris and **Katrine Qvortrup** with EPFL in Lausanne.

Finally, **Mads H. Clausen** has a PhD collaboration with Technion in Israel.

**The Nordic Five Tech** is a strategic alliance of the five leading technical universities in Denmark, Finland, Norway and Sweden. The alliance was established in November 2006 with the goal of utilizing the shared and complementary strengths and creating synergies within education, research and innovation.



**The EuroTech Universities Alliance** is a strategic partnership of leading European universities of science and technology joining forces to build a strong, sustainable, sovereign, and resilient Europe.



# Facilities & Services



## The NMR Center • DTU

is a campus infrastructure hosted by DTU Chemistry for the benefit of all departments and centers at DTU, as well as external academic and industrial partners.

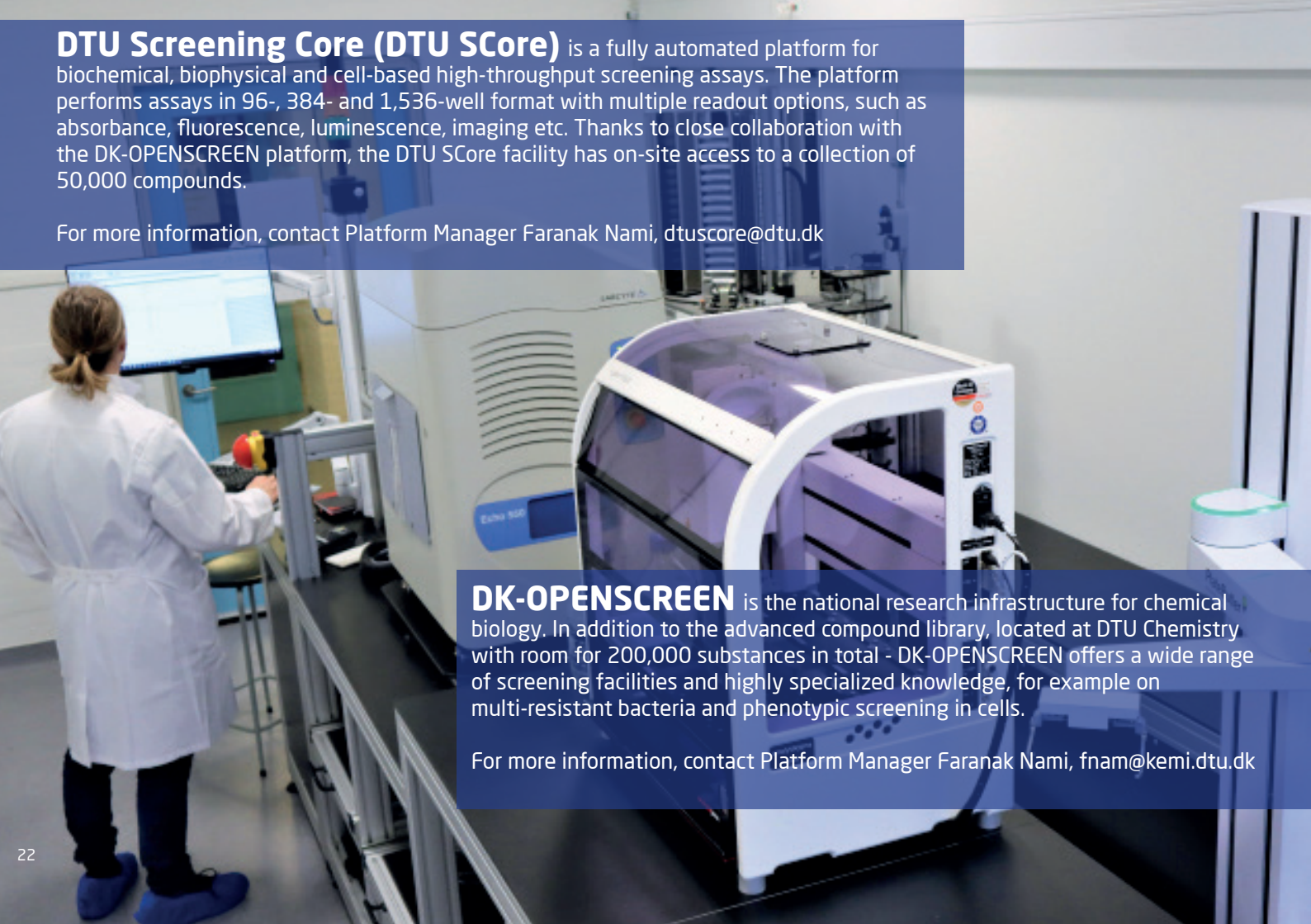
The NMR Center • DTU provides access to state-of-the-art NMR instrumentation ranging from 400 to 800 MHz.

NMR spectroscopy provides molecular information in a variety of liquid or solid samples. In doing so, NMR spectroscopy delivers an unbiased overview of molecular structures and functions. The opportunity to avoid “working blindly” immensely accelerates research projects and provides rapid quality control of chemical processes and products. Thus, NMR spectroscopy can contribute vastly to the efficient use of project resources.

For more information, please contact:

Head of the NMR Center • DTU  
Charlotte Held Gotfredsen, [nmr@dtu.dk](mailto:nmr@dtu.dk)

Laboratory Manager  
Kasper Enemark-Rasmussen, [nmr@dtu.dk](mailto:nmr@dtu.dk)



**DTU Screening Core (DTU SCORE)** is a fully automated platform for biochemical, biophysical and cell-based high-throughput screening assays. The platform performs assays in 96-, 384- and 1,536-well format with multiple readout options, such as absorbance, fluorescence, luminescence, imaging etc. Thanks to close collaboration with the DK-OPENSOURCE platform, the DTU SCORE facility has on-site access to a collection of 50,000 compounds.

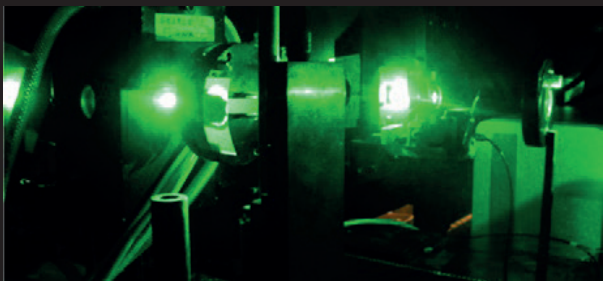
For more information, contact Platform Manager Faranak Nami, [dtuscore@dtu.dk](mailto:dtuscore@dtu.dk)

**DK-OPENSOURCE** is the national research infrastructure for chemical biology. In addition to the advanced compound library, located at DTU Chemistry with room for 200,000 substances in total - DK-OPENSOURCE offers a wide range of screening facilities and highly specialized knowledge, for example on multi-resistant bacteria and phenotypic screening in cells.

For more information, contact Platform Manager Faranak Nami, [fnam@kemi.dtu.dk](mailto:fnam@kemi.dtu.dk)

**X-ray diffraction** and **crystallography** provides access to the atomic-level spatial structure of crystalline materials. DTU Chemistry offers single-crystal structure determination as well as X-ray diffraction analysis of powders, thin films, fibers, etc. for both academia and industry.

For more information, please visit the website:  
[kemi.dtu.dk/english/research/facilities](http://kemi.dtu.dk/english/research/facilities)



**Raman Spectroscopy** is an universal analytical technique for identification of molecules in gases, liquids and solids by scattering of laser light. The Department is equipped with a confocal Raman instrument associated with a microscope and fiber optics.

For more information, please visit the website:  
[kemi.dtu.dk/english/research/facilities](http://kemi.dtu.dk/english/research/facilities)



## Renovation of education and research laboratories

DTU Chemistry now has modern and energy optimized laboratories with focus on safety, great work environment and indoor climate for researchers, laboratory technicians and students.

Among other things, new height adjustable fume hoods, an improved ventilation system with local exhaust ventilation and adjustable lighting have been installed. The design of the laboratories has been optimized and now provides first-class functionality for both education and research.



# The green Chemistry Square

In 2022, a transformation of the DTU Chemistry Square started and it will be ready for use at semester start in September 2023.

The Chemistry Square is 135 meters long and is one of DTU's four large squares. The green identity is important to DTU and the idea is to provide a square that gives space to all parts of campus life that can unfold under an open sky.

The updated Chemistry Square will hold a garden pond, a multi-functional area and a large gable bench and promises for outdoor lunches, meetings, lectures and breaks.



# Honours



## PhD receives Young Researcher Award

Former PhD student from DTU Chemistry Charlotte Uldahl Jansen received a DTU Young Researchers Award for her accomplishments during her PhD studies. Her topic: *"A Novel Site-Selective Bioconjugation Strategy for the Synthesis of Energy Harvesting Protein-Conjugates"*

The award is based on the research and overall performance during the PhD studies. This award honours young researchers who have done an extraordinary effort and who have great potential for further development.

## PhD receives Otto Mønsted Foundation's 'The Bright idea 2022'

Former PhD student Luca Piccirilli from DTU Chemistry received the prestigious award and 250,000 DKK in 2022.

Luca Piccirilli was awarded for finding a solution to a fundamental problem concerning the use of hydrogen as "fuel" in cars. His 'bright idea' contributes to a so far unseen energy optimization of hydrogen and has brought hydrogen a step closer to commercial use.





## **Torkil Holm Prize 2022 - Kasper Steen Pedersen**

Professor Kasper Steen Pedersen has received the prestigious Torkil Holm Prize for his ground-breaking research on functional metal-organic framework materials, a crossroad between molecules and conventional solid-state materials.

The prize includes a personal grant of 50,000 DKK and is funded by the Torkil Holm Foundation.

## **Janus Juul Eriksen new member of The Young Academy**

Associate Professor Janus Juul Eriksen was one of 9 young academics who was elected as a member of the Danish Young Academy. The Danish Young Academy is an independent scientific academy of young talented researchers from all branches of science in Denmark under the Royal Danish Academy of Sciences.

The purpose of the academy is to strengthen basic research and interdisciplinary exchanges, to link science and society - and giving voice to some of the most skilled young researchers in the public.



# Outreach

**Industry Project Day** In 2022, the Department once again hosted an Industry Project Day. Industrial partners had the opportunity to present potential projects to BSc, BEng, and MSc students from DTU Chemistry. Several companies such as Aquaporin, Novozymes, Haldor Topsoe, and Synopsys Denmark proposed interesting projects and interacted with the students. More Industry Project Days will be arranged in the future, and DTU Chemistry looks forward to seeing even more companies join. For more information, please contact **Maria Bundgaard: [mabu@kemi.dtu.dk](mailto:mabu@kemi.dtu.dk)**

**DTU ScienceShow** DTU ScienceShow consists of a group of students who deliver a professional science show with entertaining and educational elements from chemistry and physics. DTU ScienceShow is part of DTU's branding and recruiting strategies and locally hosted at DTU Chemistry with Professor Anders Riisager heading the Advisory Board.

**High School Lectures** DTU Chemistry hosts a broad range of lectures such as 'Green Chemistry and Technology' for high school students.

**Girls' Day in Science** For Girls' Day in Science, we invite young women for an inspiring day together with female DTU employees. We hope that that these young women will see the possibilities of being a part of developing technologies that make a difference in the future.

**Open House 2022** Open House is an opportunity for future students to learn more about our study branches and programmes, get a guided tour and listen to presentations from fully-trained engineers.

**UNF Chemistry Camp** The purpose of Ungdommens naturvidenskabelige forening (UNF) is to spread the interest of natural science, especially among young people. Chemistry Camp is for participants with a special interest in learning more about chemistry - both practically and theoretically.

**Chemistry Olympiad** The Chemistry Olympiad sees talents from across the globe compete in solving both practical and theoretical challenges.



Girls' Day in Science



Open House 2022



David Tanner Symposium

Chemistry Olympiad



DTU ScienceShow 2022



UNF Chemistry Camp

# World Class Education

Faculty is committed to support the education of future chemists through lectures and supervision. In addition to daily teaching, DTU Chemistry takes great responsibility for the study management of three of DTU's programmes by having three Heads of Study:

- **Professor Jens Ø. Duus**, MSc programme Applied Chemistry
- **Professor Klaus B. Møller**, BSc programme Chemistry and Technology
- **Professor Mads H. Clausen**, BSc programme Life Science Engineering

## BSc admission in 2022:

127 students - Life Science Engineering

62 students - Chemistry and Technology



73

BEng, BSc, MSc, and PhD courses managed by faculty

## MSc admission in 2022:

61 students - Applied Chemistry

# Part of a leading university - DTU rankings\*

## Leiden Ranking

Citation Impact Indicator (top 10% publications)  
All sciences

Nordic Region\*\*

1

Europe

49

World

122

## Leiden Ranking

Proportion of Collaborative Publications  
with Industry

2

4

9

## QS World University Rankings

5

37

104

\* As per 29 November 2022

\*\* The Nordic region consists of Denmark,  
Sweden, Norway, Finland, and Iceland

Danmarks  
Tekniske  
Universitet

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