2023

at a glance

Advanced
Research Center
Chemical Building
Blocks Consortium

We hereby present you the highlights of ARC CBBC in 2023 *at a glance!*

Discover the first edition of our HighTech Chemistry Event, our new projects, and many more topics in this year's public year report.

Table of contents

Timeline 2023

We were present at various events throughout the year. We organized some events ourselves, others we joined as guests. In this timeline, you can find some of the events at which you could find us. Did you get the chance to meet our people?

WHO visits UU hub laboratory
24 January

Presentation Skills Course
9 March

European Coatings Show
28-30 March

Operando VII
7-11 May

ARC CBBC Summer School
12-14 June

IUPAC | CHAINS
18-25 August

Utrecht Science Week
29 September

ARC CBBC HighTech Chemistry Event
3 October

Visit LERU-ENTE at Utrecht University
29 November

6-8 March
NCCC

16 March
Online lecture by Moniek Tromp

4 April
Pathways to Sustainability Conference

16 May
Vlogs at Eemsdelta-visie

20 June
VVVF Innovation Day

27 August - 1 September
EuropaCat

2 October
ARC CBBC Community Event

25 Oktober
Visit AkzoNobel Sassenheim

HighTech Chemistry Event

This year, ARC CBBC launched the first edition of the HighTech Chemistry event. Held at Eindhoven University of Technology, the purpose of this event is to continue building a bridge from fundamental chemical research to the manufacturing industry.

The event was attended by more than 170 visitors, who were all eager to learn about ARC CBBC's research, the needs of larger industries such as VDL, and the hiccups experienced by new innovative start-ups with respect to regulations and funding in their endeavour to accelerate the transition to a circular economy. A break-out session in the form of six roundtable conversations was organized to explore the possible needs, problems and collaborations in specific fields such as the use of waste, plasma, energy and artificial intelligence. More generic topics were also discussed, such educating young talent and collaboration with other educational institutes and campuses.

The round tables are actively followed up by more topic-focused lunch sessions where several parties such as SME's, scientists and other institutions are involved to fine tune possible actions to be taken. We look forward to the next edition of the HighTech Chemistry Event!

HighTech Chemistry Event: an Impression

Left: Moderator Anouschka Laheij, Slivia Lenaerts and Bert Weckhuysen at the HighTech Chemistry Event
Below: Round table sessions during the HighTech Chemistry Event

Rens Kamphorst (TUD)

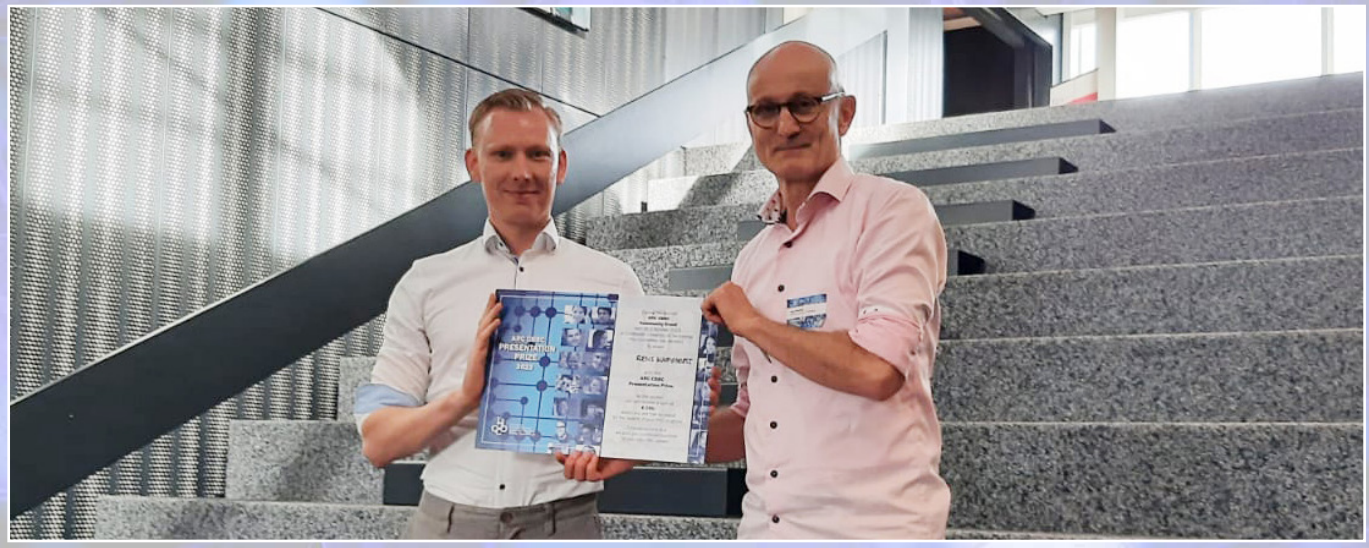
At ARC CBBC, we have seen our fair share of projects involving coatings over the years. In particular, we have worked towards answering questions like: how can we produce coatings from biobased materials? Can we substitute harmful additives with more ecologically friendly alternatives? And can we simultaneously ensure that these coatings are water-based?

Our multilateral projects focusing on coatings are a fantastic example of research being conducted on this topic. Most of our questions about coatings concern everyday objects: cars, furniture, walls or storage tanks. However, when considering much smaller objects, new complications arise. How, for example, can we apply a coating to an object so small it cannot even be discerned by the naked eye? This question arises when trying to apply a coating to fine powders. Since coating these very small particles one by one would be highly inefficient, another question springs to mind too: how can we coat millions individual particles simultaneously? These are the questions Rens Kamphorst, a PhD student at Delft University of Technology, has been asking himself within the context of the project he has been working on over the past few years in collaboration with Nouryon.

There are even more fundamental hurdles to overcome when coating big batches of powders, especially when the size of the individual particles is very small. To understand this, think about taking a big scoop of table salt, but also a scoop of flour. You already know that the flour makes a way taller heap on top of the spoon. This effect stems from the fact that the individual flour particles are way smaller than the salt grains, and therefore tend to stick together. This cohesiveness needs to be overcome to separate all particles, such that their entire surface is available to be coated.

Rens focused on optimizing methods to mitigate the stickiness of fine powders in so-called ‘fluidized beds reactors’. In these reactors, gas is injected into a powder bed such that the particles start to ‘float’ and hover around. The studied methods Rens used to battle against the cohesive nature of the particles include shaking, stirring and introducing pressure waves within the system. To test the efficiency of these methods, he used X-rays, a useful method to look into the reactor without opening it. This is, indeed, the very same technique used in hospitals or at the dentist to image fractured bones or your teeth. Not only is Rens studying techniques to deposit coatings onto super small particles, he is applying a technique we are all familiar with in a completely new way. When the cohesive nature of the powder is successfully mitigated, chemicals can be injected in the gas phase that react with the powder surface to form a coating around each individual particle. The presentation of his research earned him the Presentation Prize at the ARC CBBC Community Event!

Below: Rens Kamphorst (left) receives the Presentation Prize from the jury, represented by Albert Schenning (TU/e) at the ARC CBBC Community Event 2023



IN THE SPOTLIGHTS

Kordula Schnabl (UU)

We are making fantastic progress in discovering alternatives to fossil feedstocks for the production of plastics. Rubbish bags for vegetable, fruit and garden waste are already being made out of starch. But did you know that you can also use crab and shrimp shells to create plastic-alternatives and other synthetic materials? This is exactly what Kordula Schnabl, a PhD student at Utrecht University, is doing in the multilateral 'Coatings' project.

Shells from crustaceans and shellfish (crabs, lobsters, crayfish, etc.), but also insect shells, molluscs, and fungi can be used equally well for this purpose. This is because they contain a substance called chitin: a long chain of carbohydrates, also called a polysaccharide. We have already made remarkable progress in the use of polysaccharides as feedstock. Starch, a different polysaccharide, is already being used as a feedstock for plastic alternatives. So we have proved already that we can use biobased feedstocks for this purpose.

Despite chitin and starch both being polysaccharides, they are quite different when you look at them in detail. New production processes will therefore need to be developed for the processing of chitin into usable polymers for plastics or coatings. This is where Kordula's research comes in the picture. She uses chitosan, a substance derived from chitin, and subsequently enriches this with various biobased additives. These additives tune the properties of the materials she makes. Doing this, she explores which types of materials can be made from this feedstock. Some additives, for example, make the materials hard; others become soft. In addition, Kordula tests the aging properties of these materials, discovering how durable they are.

Part of Kordula's research was published in 2023, and she even provided the cover art for the edition of ChemSusChem that featured her publication!

Our Story

As illustrated by our slogan 'Greenifying Chemistry', ARC CBBC has been serving as a bridge between the academic world and the chemical industry for eight years now. This public-private partnership brings out the best in both worlds, in which academic need-to-know and industrial need-to-have inspire one another to think beyond the boundaries of individual disciplines. With over 50 projects, we are well on the road to achieving our goals – but still have a distance to travel.

Left: Jason Heinrichs (TU/e) at the ARC CBBC Community Event 2023
Right: Hugo den Besten in the RUG lab

Our first PhD and postdoctoral projects were launched in 2016. They were set up in conjunction with our hub universities (Utrecht University, the University of Groningen and Eindhoven University of Technology) and our founding industrial partners (AkzoNobel, Shell, BASF, Nouryon and Nobian). The first three multilateral projects we launched were Coatings, Small Molecule Activation and Fundamentals of Catalysis. Aside from these, multiple projects were initiated by the above organizations as well as associate partners throughout the Netherlands, all with a view to optimizing the exchange of expertise. In the meantime, eight years have passed. Our first projects have largely been concluded, but that does not mean that we have reached our goal. The topics we are addressing are complex, and cannot be resolved within the timeframe of one project. This is why we have launched new multilateral projects that continue where their predecessors left off.

Smart Coatings aims is to delve even further into the world of sustainable coatings, while Methane Pyrolysis addresses the sustainable production of hydrogen with usable materials as a byproduct rather than carbon dioxide. These are all projects with potential, and of unwavering interest to us.

Despite the diversity of projects that are being launched and rounded off, our focus remains unchanged. Our purpose is to rethink the design of the chemical building blocks that make up the products of our everyday lives, and the convenience they bring us. We investigate manufacturing routes and the use of chemical products and processes, and examine these with a critical eye. We unite universities, researchers, businesses and ministries, with whom we collaborate closely – all with a single goal: to provide the world with the molecules of the future.

Our Research Themes

Our research programme is constructed around the principle of developing alternative and – above all – greener methods for the chemical industry. Our ultimate goal is to close 'the product loop' and, by doing so, transform it into a fully recyclable model. Therefore, part of our programme focuses on the conversion of various types of feedstocks for the bulk chemicals industry, including biomass, CO_2, natural gases (such as methane) and plastic waste.

ARC CBBC conducts both blue sky and topic-specific research. Our topic-specific research is carried out in close collaboration with our industry partners' R&D divisions. Together, we aim to improve specific industrial processes where they matter most. We also carry out pre-competitive projects, in which we conduct blue sky research as well as a number of exploratory, curiosity-driven projects. These have the potential to yield ground-breaking results in the race towards a green and circular industry.

Our research focuses on three transitions.
All of our projects are linked to one or more of these transitions:

energy transition | materials transition | feedstock transition

1. The energy transition

Our energy supply has often been based on the use of fossil fuels, and moving away from this is far easier said than done. However, we are constantly learning more about how to generate electricity more sustainably. A key element in the transition to a more sustainable chemical industry is the switch to electricity as an energy source. This process, called electrification, is becoming increasingly visible all around us, as illustrated by the increasing popularity of electrically powered cars and heat pumps. Switching to electricity as an energy source is also of crucial importance in the chemical industry. Of course, this does require the redesign of the customary chemical production processes. Our chemists are eager to set to work on reinventing these processes and making the switch to electrically powered production processes. One of these chemists is Tessa de Koning Gans, whose work is presented on Page 12.

2. The materials transition

What is better than the sustainable manufacture of new products? Ensuring that the products we are already using do not need to be replaced! We can take a significant step in the right direction by ensuring that products last longer or can be augmented with additional functions, so that no new products need to be made. The coatings developed by Nathália Tavares Costa, about which you can read on Page 17, are a fine example of this. Redesigned materials also lead to energy savings. Can we create more efficient catalysts, for example, so that chemical reactions are less energy-consuming? And can we simultaneously ensure that the production of these catalysts no longer require the use of expensive and hazardous materials?

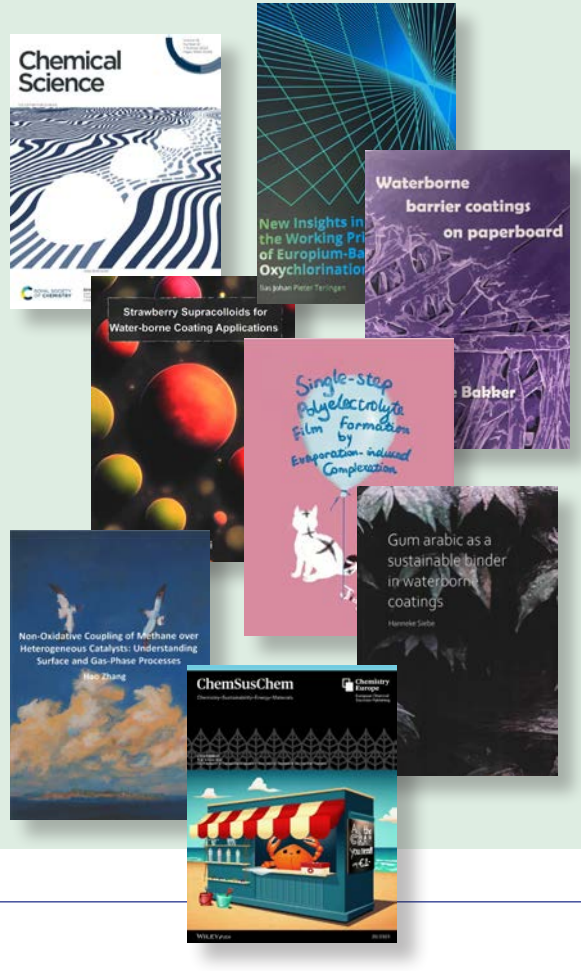
3. The feedstock transition

Many of our products have their origins in non-renewable feedstocks. Plastics, cleaning agents and other products made by the chemical industry are all examples of this. By replacing these non-renewable, often fossil feedstocks with renewable alternatives, we can take a significant step in the greenification of the chemical industry. Can we use waste, or even CO_2 to make our products? The projects executed by Kordula Schnabl (Page 7) and En Chen (Page 11) are both excellent examples of this transition.

Our Publications

The results of our work regularly find their way to a huge diversity of scientific journals. Some of these publications were even featured on their covers!

A comprehensive overview of our publications can be found on our website.



En Chen (UU)

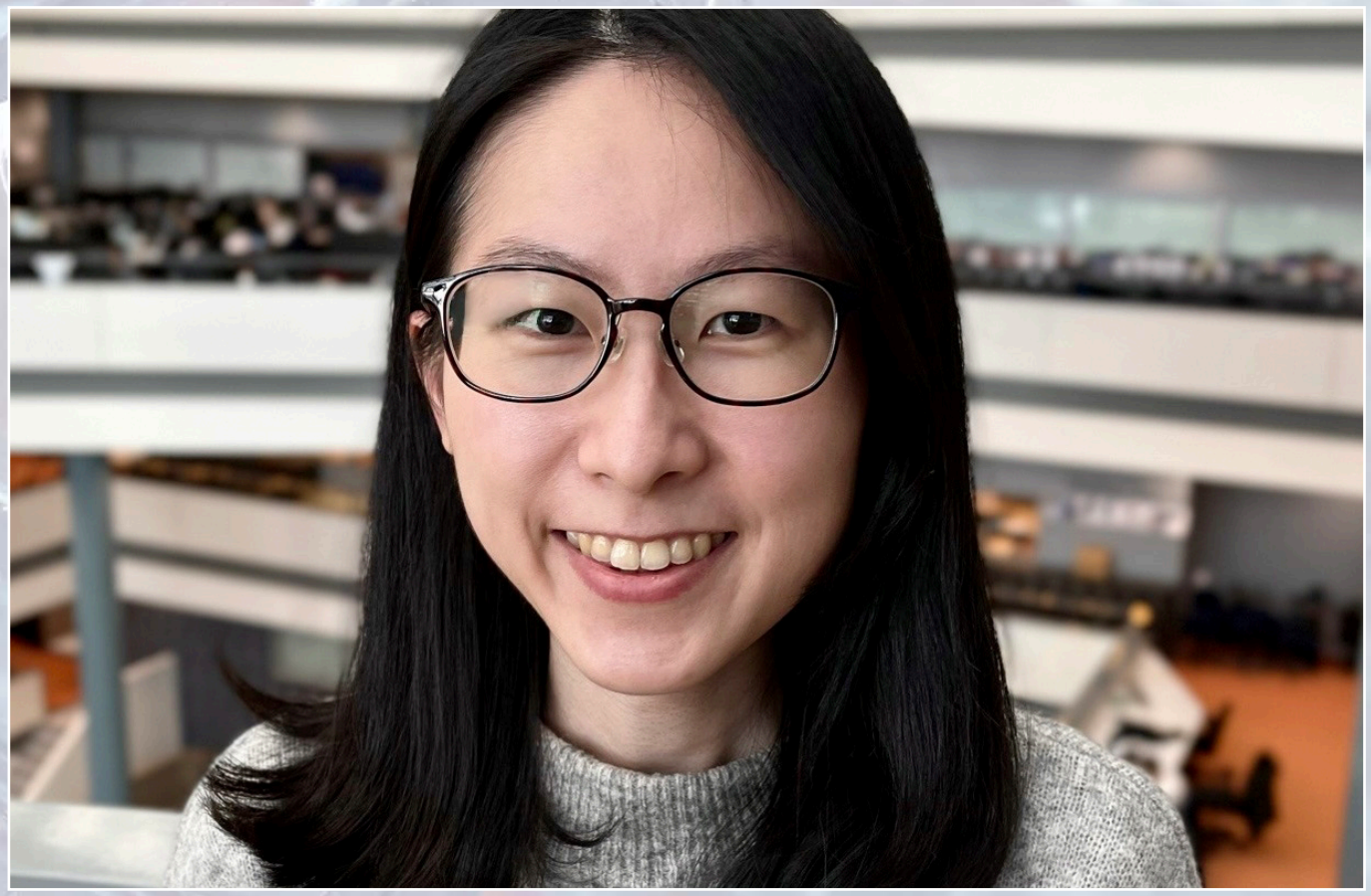
In the search for new feedstocks, there is one available in such large quantities that it would be great if we could use it to our advantage: plastic. Obviously, this not a substance that can be found in nature, but it is something that we currently have in excess. We depend on plastics a lot in our daily lives for their convenient properties, having plastic waste as an undesirable consequence.

However, using plastic waste as a feedstock is easier said than done. The first step in the process is to break down this plastic waste into chemical building blocks. Apart from that, plastics are generally made to last as long as possible, and to repel outside influences to the greatest possible extent. Unfortunately, we need these outside influences to break down plastics, which means that most methods to achieve this work only very slowly – if at all. En Chen is working at Utrecht University in the multilateral 'New Chemistry for a Sustainable Future' project on the development of a new method for breaking down plastics: one that makes use of UV light.

The plastics that En focuses on are primarily polyethylene (PE) and polypropylene, which we call polyolefins. She is making use of a small intermediate step by introducing oxygen atoms into the plastic chains rather than breaking them down immediately. These oxygen atoms weaken the plastic chain, making it easier to break down. After this, the chain can be broken down into small chemical building blocks, which can subsequently be used in the manufacture of new products. En explains her research in greater detail in an interview.

If this method turns out to be successful, it could be used to convert plastic waste into a valuable feedstock in the long term. Not only would this help us reduce our dependency on fossil feedstocks in the manufacturing industry; we would also be making good use of a waste product that we would otherwise be burdened with.

Lab interview with En Chen



Tessa de Koning Gans (UT)

What can we do to reduce our CO_2 emissions? This is a hot topic in science all over the world today. Reducing CO_2 emissions is obviously of crucial importance, but what if we were to look at it differently? What if we were to do something useful with the CO_2 we emit into our atmosphere? If it were up to Tessa de Koning Gans, a PhD student at the University of Twente participating in the multilateral 'New Chemistries for a Sustainable Future' project, this is certainly something we should consider.

CO_2 molecules are actually tiny fragments that are formed when bigger, carbon-containing molecules (compounds, actually) are oxidized through combustion. Oil, natural gas, wood or the sugar in our bodies are all examples of this. If we could find a way to glue these CO_2 molecules back together, like the pieces of a jigsaw puzzle, we would theoretically be able to create a bigger molecule again.

It sounds too good to be true: making new fuel from the CO_2 in the air. As a matter of fact, we can already do this. However, there is still a lot of work ahead of us before this can be done in an affordable manner and on a large enough scale.

Tessa's research is directed at the conversion of CO_2 into CO: a carbon building block that is far easier to process than CO_2, and which can subsequently be used to make products such as plastics and fuels. Tessa makes this CO with the aid of redox reactions. These can be seen as twin reactions. In order for one of these reactions to be successful, a second reaction has to take place at the same time. In this case, the first reaction is the conversion of CO_2 into CO, which is obviously very useful. However, the product of the second reaction in a twin reaction is often something for which we have no particular use. But couldn't this second reaction be used to create something useful, effectively allowing us to 'kill two birds with one stone'? That's exactly what Tessa is wondering. She uses electrochemistry to steer these redox reactions in the right direction. By trying different parameters, she can tweak the reaction that takes place, and design it just the way she wants to.

Tessa was interviewed by UToday in the journal's PhD Stories column, which is dedicated to research conducted by PhD students. Here, she explained not only what she is working on, but also why she enjoys it so much, and spoke about her life as a PhD student in general. She also participated in the vlogs on the Eemsdelta Complex, which was broadcast on Eemsdeltavisie.

- Interview Tessa Koning de Gans in UToday
- Vlog on Eemsdeltavisie

Outreach - events

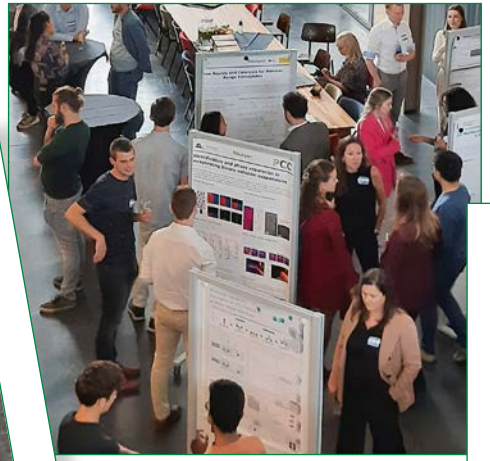
You have probably encountered ARC CBBC at various places last year. Aside from the events hosted by our organization, where we offered various researchers and organizations an opportunity to present themselves, we participated in several external events.
We were also visible in various media! You can find this on page 14.

Apart from participating in a number of relevant events hosted by other organizations, we also organized a diversity of events under our own management. In addition to our annual Summer School and Community Event for our researchers and members, we launched the ARC CBBC HighTech Chemistry Event. You can read more about this on Page 5.

Ina Vollmer gave a lecture at Science 4 Sustainability hosted by Utrecht University

Ellard Hooiveld at NWO Physics

Tessa de Koning Gans and Thomas Freese created a vlog for Eemsdeltavisie



The ARC CBBC Community Event

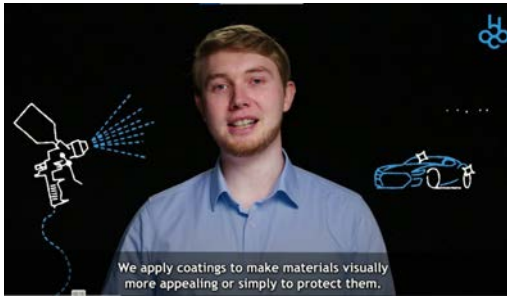
Mirjam de Graaf presented a poster at EuropaCat

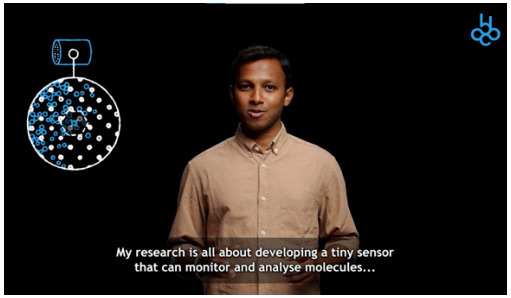
Bert Weckhuysen (right) and Patrick Cramers (Utrecht University of Applied Sciences) during the Utrecht Science Week

Outreach - in the media

C2W is a professional journal for the chemical industry and an initiative of the Royal Netherlands Chemistry Society (KNCV).
The journal published several articles featuring our people and our research in 2023, including interviews with our members Matthias Bickelhaupt and Adri Minnaard and in-depth presentations on the research conducted by Eva Blokker, Matteo Monai and Bert Weckhuysen.
C2W also presented an item on Jiaying Li's illustrated thesis!

Eye-Openers, an initiative of KNCV, are brief videos in which researchers present pitches for their research projects. PhD students Tizian Ramspoth, Harith Gurunarayanan and David Rieder all made Eye-Openers in 2023.
Click them to see the videos!





CHANGE INC.

Change Inc. compiled a report about our hub lab in Utrecht, and spoke about this with Bert Weckhuysen and PhD student Sofie Ferwerda.

ARC CBBC is also featured in numerous videos and podcasts. Bert Weckhuysen was a guest speaker in the NTR podcast Kennis & Co.
PhD student Lotte Metz created a video about nanogold at the University of the Netherlands.

The Dutch Association of Paint and Printing Ink Manufacturers (VVVF) also publishes a professional journal: Verf&Inkt. Considering that VVVF is more than aware of our extensive expertise in the field of paints and coatings, it is hardly surprising that PhD students Hanneke Siebe and Nathália Tavares Costa whose research is presented on Page 16, were interviewed in the journal's Beroep in Beeld column. This column shines a spotlight on relevant professions.
Our member Wesley Browne was also featured in Verf&Inkt.

Education

ARC CBBC aims to support and educate the next generation of leaders in the chemical sector by helping them become connectors and ambassadors for their own research.

A significant component in our education programme is our annual summer school. This year, the educative three-day programme included a highly successful event held on the premises of our industrial partner Shell. Other locations were the Energy Transition Campus Amsterdam and the Chemicals Park in Moerdijk, where the students participated in tours of the labs, lectures given by members of the R&D departments (including ARC CBBC alumna Sanjana Chandrashekar) and a tour of the Shell plant in Moerdijk. One of the days was also dedicated to lectures from ARC CBBC principal investigators and a lecture from Prof. Derk Loorbach (Professor of Socio-Economic Transitions at Erasmus University), who presented a new perspective on the energy transition. Furthermore, students took part in interactive sessions such as science speed dating with the aim of strengthening their sense of community.

ARC CBBC wants its PhD students to be involved in today's society; to be able to convey the importance of their research to the general public, stakeholders, industry and politics. We believe that talent manifests itself in various skills. Being an excellent scientist is one, but so is the ability to take on a leadership role or enthuse a lay audience for your work. All those qualities help shape the researchers of today. As such, ARC CBBC offers workshops that focus on helping students improve their soft skills. A prime example of this is a presentation training course that is given each year. This popular course is well-received, and the students who take part in it are often invited to present their research at events organized by ARC CBBC.

Top: ARC CBBC visiting Shell Chemicals Park during the Summer School
Left: Also important - having a break and socializing!

IN THE SPOTLIGHTS

David Rieder (TU/e)

In one of our narratives, we showed how computer simulations can improve the efficiency, cost-effectiveness and sustainability of scientific research. We can apply these simulations in numerous situations, and in myriad processes. In the narrative, Morteza Hadian simulated the conversion of methane into carbon materials and hydrogen. David Rieder, however, took computer simulations in an entirely different direction.

David worked at Eindhoven University of Technology on simulations for the preparation of catalysts as part of the multilateral 'Fundamentals of Catalysis' project. More specifically, he focused on the moistening and drying of catalyst pellets, which is an important aspect to consider when applying an active coating to these particles. Given that these are often dissolved into a fluid, it is important to know how the particles dry after the fluid has been applied, as well as whether and how the active coating has adhered successfully to the dry particles.

Simulating the drying process allows you to see much faster if the envisioned result has been achieved or if any adjustments are still needed at a given point in the process. Instead of trying out all the options one at a time, David has been simulating all the options simultaneously.

Meanwhile, he explored the potentials of intelligent pellet design. Afterwards, the best options – those with the highest chances of success – can be tested in the lab.

David also produced an Eye Opener on his research, in which he explains what he is working on. In addition to this, he defended his thesis successfully at the beginning of 2024, which has earned him a place on the list of ARC CBBC alumni.

- Narrative Process Engineering
- Eye-Opener David Rieder

IN THE SPOTLIGHTS

Nathália Tavares Costa (UT)

We all know that feeling you get when you are in a stuffy room where too many people are packed together for too long. Airing can be a help, but this isn't always possible and doesn't tackle the problem at its roots. After some time, harmful substances from all sorts of sources can pile up in the air, causing the quality of the air to drastically worsen. Think of dust, mold, or small particles of construction materials stuck in the ventilation system. The resulting symptoms include headaches, fatigue and nausea, just to name a few. There is even a name for this phenomenon: sick building syndrome.

Interview Nathália Tavares Costa in Verf&Inkt

Nathália Tavares Costa is attempting to solve this problem through the research she is conducting at the University of Twente as part of the multilateral 'Coatings' project. For example, she collaborates intensively with fellow ARC CBBC PhD candidate Mirjam de Graaf from Utrecht University. They are working on a coating that breaks down harmful substances in the air, with a view to preventing the air quality from deteriorating. More specifically: they are working on a catalyst that breaks down these harmful substances, and which will subsequently be processed into a coating. This catalyst is driven as well as powered by light. We call this photocatalysis. Using light for air filtration saves energy needed from other sources, making it an environmentally friendly option.

We will, however, have to wait some time before this air-purifying coating can be brought to the market, but it is a wonderful prospect for the future. Until then, Nathália will keep working on the optimization of this coating. In 2023 Nathália was interviewed by Verf&Inkt, the journal issued by the Dutch Association of Paint and Printing Ink Manufacturers (VVVF), where she spoke about her research and her life in the Netherlands as a Brazilian citizen.

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Manon van Asselt – *NWO*

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Dr Robert Terörde – *BASF*

• The following knowledge expert has left the EB in 2023:
Dr Emma Winkels – *NWO*

• The following knowledge expert has joined the EB in 2023:
Manon van Asselt - *NWO*

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The following members have left the SAB in 2023:
Prof. Dr Ib Chorkendorff – *Technical University of Denmark, Denmark*
Prof. Dr John Dennis – *University of Cambridge, UK*

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Prof. Dr ir. René Janssen – *Eindhoven University of Technology*
Prof. Dr ir. Richard van de Sanden – DIFFER
Prof. Dr ir. Ruud van Ommen – *Delft University of Technology*
Prof. Dr Sijbren Otto – *Groningen University*
Prof. Dr Syuzanna Harutyunyan – *Groningen University*
Prof. Dr ir. Thijs Vlugt – *Delft University of Technology*
Prof. Dr ir. Wesley Browne – *Groningen University*
Prof. Dr ir. W.M. Wiebe de Vos – *University of Twente*
Dr Wilson Smith – *Delft University of Technology*

• The following members have left in 2023:
Prof. Dr Floris Rutjes – *Radboud University Nijmegen*
Prof. Dr Freek Kapteijn – *Delft University of Technology*
Prof. Dr Hans de Vries – *University of Groningen*
Prof. Dr ir. Krijn de Jong – *Utrecht University*
Prof. Dr Marjolein Dijkstra – *Utrecht University*
Prof. Dr ir. Niels Deen – *Eindhoven University of Technology*
Dr Wilson Smith – *Delft University of Technology*

• The following members have joined in 2023:
Prof. Dr Atsushi Urakawa – *Delft University of Technology*
Dr Nong Artrith – *Utrecht University*
Prof. Dr ir. Richard van de Sanden – *DIFFER*

Tenure Track Assistant Professors
Matteo Monai – *Utrecht University*
Eline Hutter – *Utrecht University*
Ina Vollmer – *Utrecht University*
Michael Lerch – *University of Groningen*
Sebastian Beil – *University of Groningen*
Nikolay Kosinov – *Eindhoven University of Technology*
Marta Costa Fiqueiredo – *Eindhoven University of Technology*

Technicians
Hannie van Berlo - van den Broek – *Utrecht University*
Ramon Oord – *Utrecht University*
Peter de Peinder – *Utrecht University*
Larry de Graaf – *Eindhoven University of Technology*
Brahim Mezari – *Eindhoven University of Technology*
Rafael Tarozo – *University of Groningen*
Dr Anouk Lubbe – *University of Groningen*
Dr Alexander Ryabchun – *University of Groningen*

• The following technician has joined in 2022:
Rafael Tarozo – *University of Groningen*

ARC CBBC Support Office
The ARC CBBC Support Office is hosted by the coordinating partner, Utrecht University.
Marijke Badings – *Communication Officer*
Dr Julien Daubignard – *Project Manager*
Dr Esther Groeneveld – *Program Manager*
Anita ter Haar – *Financial Controller*
Anita den Heijer – *Office Manager*
Jeroen Meijer – *Communication Officer*
Dr Anne-Eva Nieuwelink – *Program Manager*
Bram van Reemst – *Data Specialist*
Masja Spijkstra – *Project Coordinator*
Hannah Thuijs – *Coordinator External Collaboration/ Communication manager*

• The following members have left the Support Office in 2023:
Dr Julien Daubignard – *Project Manager*
Dr Anne-Eva Nieuwelink – *Program Manager*
Bram van Reemst – Data Specialist

• The following member has joined the Support Office in 2023:
Dr Esther Groeneveld – *Program Manager*

Our new researchers

In 2023, we have welcomed a fair amount of new PhD candidates and postdoctoral researchers. Click them to learn more!

Tianbo Duan
PhD, UvA

Jelmer Meijer
PhD, RUG

Mahdi Samapour
PhD, RUG

Marina Karsakova
PhD, RUG

Ryno van Niekerk
PhD, TU/e

Jesse Buckmann
PhD, UU

Bas ten Hartigh
PhD, UU

Hanya Spoelstra
PhD, UU

Jan den Hollander
PhD, UU

Daan van Eck
PhD, UU

Jeroen Smaak
PhD, UL

Jonas Gans
PhD, DIFFER

Keimpe-Oeds van den Berg
PhD, RUG

Roy Maas
PhD, UU

Chun Lam Clement Chan
PD, RUG

Qi Zhang
PD, RUG

George Tierney
PD, UU

Our Alumni

The following people have successfully defended their thesis in 2023, and can now call themselves ARC CBBC alumni!

Bas van Gorkom
TU/e

Francesco Mattarozzi
UU

Hanneke Siebe
RUG

Jiaying Li
UT

Kaijian Zhu
UT

Morteza Hadian
TU/e

Sarina Massmann,
RUG

Siyu Li
TU/e

Sobhan Neyrizi
UT

Sterre Bakker
TU/e

Bas Terlingen
UU

George Hermens
RUG

Hao Zhang
TU/e

Contact Details

ARC CBBC

Vening Meinsz building C
Princetonlaan 6
3584 CB Utrecht
The Netherlands
info@arc-cbbc.nl

Sitemap

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Advanced Research Center Chemical Building Blocks Consortium

Utrecht University

university of groningen

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

AkzoNobel

BASF

ChemistryNL

NWO