



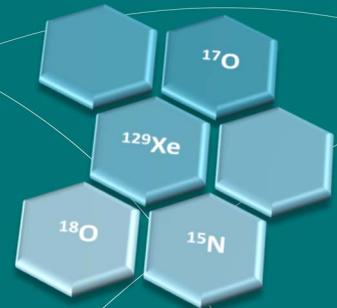
NUKEM

Isotopes

YEARS

Anniversary

Your global supplier for stable isotopes





“We dedicate this anniversary publication to the friends of our company, our customers, suppliers, employees and retirees.”

2011-2021

10 years of NUKEM Isotopes - good reason to scroll through the history of our company, which in fact started much earlier.

History

On **May the 5th 1955**, the Federal Republic of Germany regained its sovereignty. New laws and regulations could now be passed. The first cautious steps towards a German atomic industry received significant impetus when an atomic



ministry was formed, led by the later Bavarian Prime Minister, Franz Josef Strauss (picture top right). It was now possible to commence research and to start working in the field of the peaceful use of Nuclear Energy - this took place at the Frankfurt headquarters of Degussa. The "Nuclear Group", which was part of the "Rare Metals" department, emerged on **April 1st, 1960** under the management of Dipl. Ing. Heinz Schimmelbusch



(picture bottom left, middle) and Dipl. Chem. Günter Wirths the company **NUKEM GmbH** as "Nuclear Chemistry and Metallurgy".

Simultaneously, laboratories and technical centers were gradually being built at the Degussa plant in Wolfgang, Hanau, Germany. In the course of the decades, several other companies, which were also active in the field of the peaceful use of nuclear energy, emerged at this factory site situated near to the Hanau city center.



The company logo of NUKEM GmbH symbolizes a uranium atom at the moment of splitting with the nuclear debris being released. If you compare the company logo of NUKEM Isotopes with the former company logo of NUKEM, you will notice that a part of it is still found within our present logo.



1960



2011

As early as 1977, around 1,400 people found secure employment at NUKEM GmbH. Further expansion in Wolfgang, Hanau was not possible, so a plot of land was acquired in nearby Alzenau, located in Bavaria. The new location was approximately 200,000 m², which meant that it was roughly the size as the old site, but with potential for future growth. In the coming decades national and international subsidiaries were founded and NUKEM invested in business in Germany and abroad.

In the 1990's, the political landscape in the Federal Republic of Germany changed significantly - for example, a state government was formed in Hesse with the participation of the Green Party. This development played a major role in the decision that NUKEM GmbH should relocate permanently from the Wolfgang site and settle entirely in neighbouring Bavaria.

Diversification - off to new shores

A department of NUKEM GmbH dealt early on with the procurement, trading and services of uranium for research and power reactors. Recognizing the tendency in Germany to turn away from the nuclear industry, the then head of the department for trading in fuels for research reactors, Hans Müller, initiated the process and asked the responsible division manager, Kurt Schreiber, for permission to deal with "peripheral products". The approach was as simple as it was logical; use the expertise, experience and contacts of employees to identify products and services that would guarantee the growth and continued existence of the department. **In 1996** the first contract for the purchase of enriched **Lithium-7** was signed in China. An Isotope that is used in the water chemistry of nuclear power plants to regulate the pH value. This contract enabled new employees to be hired. As from the beginning, the company was still limited to contacts within the nuclear industry, therefore the next isotopes **depleted Zinc-64** and **Boron-10**, which are used as a neutron capture in power plants, were added to the portfolio. This strategy did not change until the end of the last millennium, when new opportunities arose due to the collapse of the former Soviet Union.

NUKEM was offered the partnership and exclusive marketing rights for the Isotope separation facility in Tbilisi, Georgia. This organization, which at that time was still a state-run organization, separated not only the Boron Isotopes **B-10** and **B-11** but also **Oxygen-18** and **Oxygen-17** as well as **Nitrogen-15**. The expansion of the NUKEM portfolio to include these Isotopes represented a significant step in diversification.



© CPI Georgia

New markets were entered into and their mechanisms had to be learned. More staff were needed in order to be able to cover a broader base. In addition to the traditional area of the nuclear industry, business expanded to include the semiconductor industry, the medical industry and agricultural research. This was an enormous challenge that the employees of the Isotopes Trading Department were able to take on - also with thanks to the foresight and patience of the NUKEM management.

In 2006, the then shareholder of NUKEM GmbH, Essen-based RWE AG, decided to limit itself to its core business - power generation. In association with other RWE subsidiaries, NUKEM GmbH was sold to the financial investor Advent International. Initially this change of ownership had no significant impact on the business processes. However, the composition of the management changed. Mr. Wilhelm Plumpe was appointed chairman by the new shareholder and would later become the future main shareholder of the new NUKEM Isotopes GmbH.

The aim of Advent International was to find new, strategic owners for the individual company holdings of the former RWE Business Unit with its more than 18,000 employees.

In 2011, NUKEM GmbH, with the extremely lucrative uranium trade, was the last company available for sale. Although Isotopes Trading was economically successful, it was strategically no longer specifically geared towards the nuclear industry, therefore it did not fit into the concept of the new buyer.

The creation of NUKEM Isotopes GmbH

For this reason, the company **NUKEM Isotopes GmbH** was founded on **November the 1st, 2011**. It is based in Alzenau. Privately owned, the main shareholder and CEO of the new company was Wilhelm Plumpe. Jürgen Laucht, who was then head of the Isotope trade department, was appointed Managing Director for operational business. In addition to him, six other employees moved to the new company, each of whom was offered the opportunity to acquire shares in NUKEM Isotopes.

At this time, business continued from the offices of the former company headquarters in the Alzenau industrial area.



Since 2011, the company's aim has been to look for new products that can expand their existing portfolio of stable isotopes. The choice fell on the Isotope **Xenon-129**, which can be used for MRI imaging in lung scans. However, this isotope must to be hyperpolarized beforehand in order to develop its benefits.

NUKEM Isotopes is therefore entering into a strategic investment in the US-based start-up company **Polarean Inc.** Polarean is striving for approval from the American FDA to approve the polarizer as a drug / device combination. In addition to financial support, NUKEM Isotopes also provides its expertise as a strategic partner for the future supply of **Xenon-129**. After successful approval by the FDA, the polarizer can be launched onto the market with the **Xenon-129** consumable.



The new generation 9820 xenon polarizer features a tunable 200W water-cooled narrowed linewidth laser, an expanded oven to accommodate substantially larger volume cells, and a 4-coil electromagnetic field configuration to provide uniform coverage over the oven and polarized gas plumbing.

© Polarean Inc.

Independence and a new home

Since the new company is designed for growth and in order to fully emancipate itself from the "old" NUKEM, the clear decision was made to build a separate company headquarters in a neutral location. The city of Alzenau showed great support in keeping the innovative company NUKEM Isotopes within the district and provided a suitable plot of land, just a



few hundred meters from the original company headquarters. In June 2018, we were able to move into our new premises on Rodenbacher Str. 47 in Alzenau.

New employees soon followed to meet the necessary requirements of the market and the needs of our customers.

Impressions of the construction of our headquarters



The excavation work can be seen in the picture above and shows the preparation for setting the foundation of our new office building. In the picture on the right, you can see the already dried foundation, ready to carry the building components.





In the final stage of the construction project, the last building elements were placed individually on the floor plate. According to a modular principle (left picture), they were connected to each other.

After they were connected, the basic framework, as well as the layout of the individual offices within the building were in place. This finally enabled us to deal with the electrical wiring in the interior rooms as well as the exterior design of the building and garden (see next page).



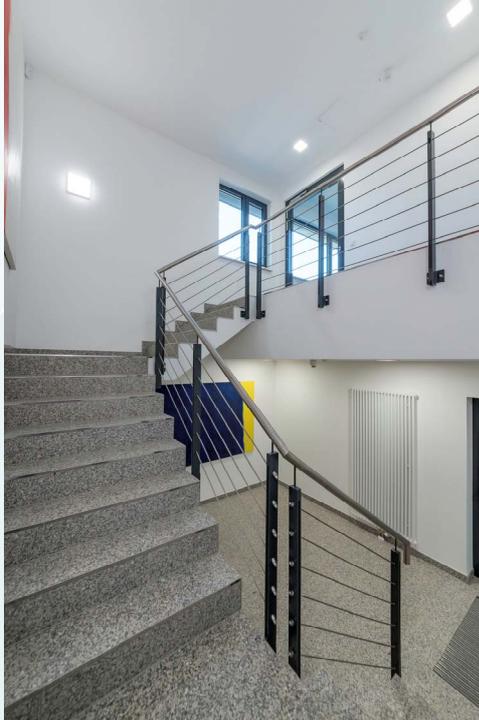


Last, but not least, the relocation was possible in **June 2018**. Each employee sorted and packed their office documents into countless boxes.

Of course, our stable isotopes inventory also had to be neatly packaged and safely transported to our new location.

Due to the proximity (approx. 1km) between the new building and the previous location as well as the good preparation, we were able to continue working directly in our new premises without any mayor interruptions.

Our new office building



The **stairway** (picture on the left) provides access to the basement (storage area for some isotopes, packing material, document storage, etc.) as well as direct access between the employee car park and the offices (picture top right).



The conference table has already brought international business partners together. In addition to the countless successful business deals negotiated here, it also offers enough space to bring the entire NUKEM Isotopes team together for events such as shareholder meetings or small celebrations such as birthdays and anniversaries.



With access from the office, corridor, kitchen and conference room, **the atrium** (with a Japanese maple tree as well as small benches) is our little oasis where we can socialize and get some fresh air in a relaxing atmosphere, without actually leaving the building.

Welcome to NUKEM Isotopes

Here you can see our **entrance area** where our international guests are welcomed. One can first enjoy a cup of tea or coffee on the couch in a quiet and pleasant atmosphere before an upcoming meeting.



Not only colleagues



In addition to our office building, we have also built a small barbecue pavilion in the garden, which offers, not only the option to enjoy lunch in the fresh air, but gives the possibility to kick off the weekend together after a successful working week.



The garden is not only for us

Many gardens today are perfectly adapted to the needs of people. Perfectly trimmed lawns or large paved areas are often found within them. We have taken a different approach to the design and have deliberately chosen a natural habitat. Some people may consider it not well maintained, but if you ask the bees, birds, lizards or any other insects, they will tell you a different story.

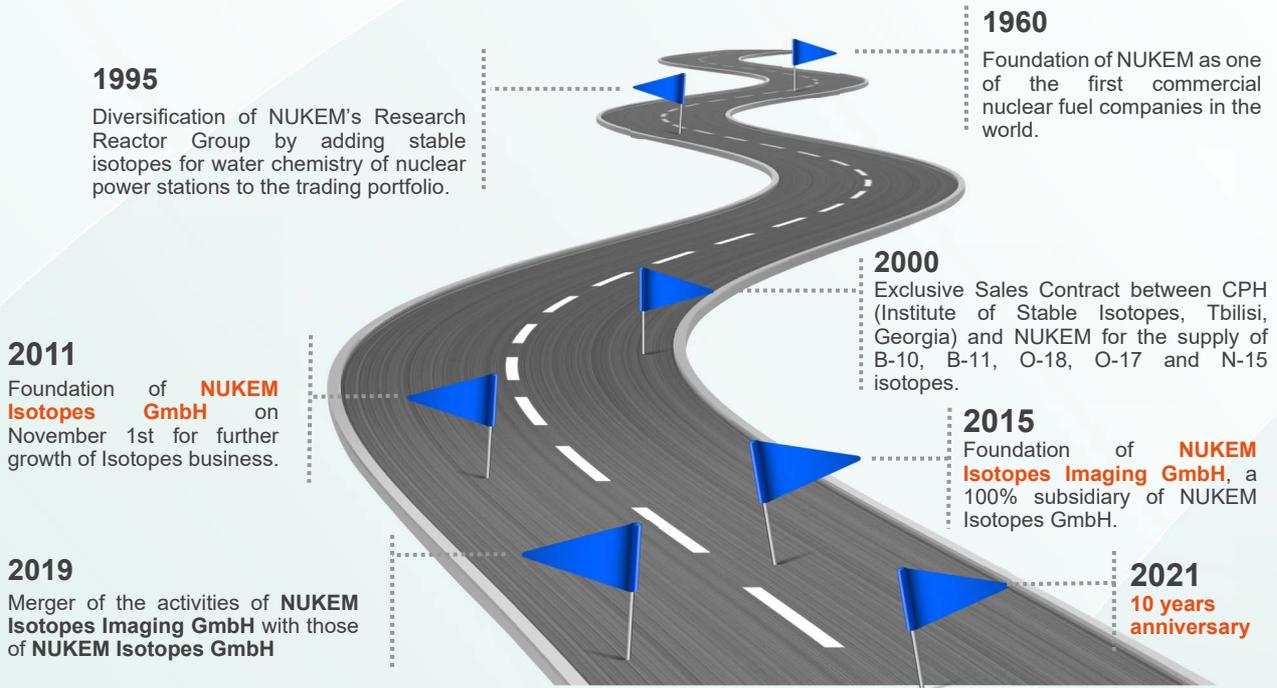


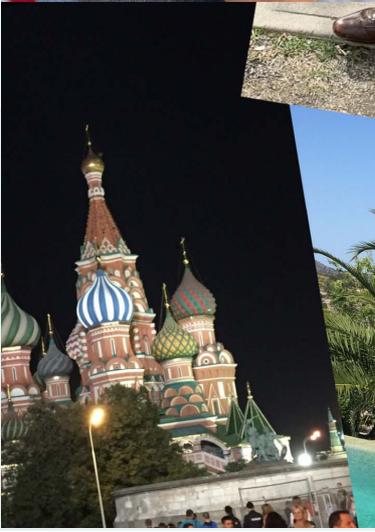
When the world suddenly stands still

When the Covid-19 pandemic brought the world to a standstill at the beginning of 2020, the management and employees of NUKEM Isotopes were faced with challenge to continue business under the given circumstances and to provide customers all over the world with urgently needed products and services. The team had to quickly adopt to working with digital media, video conferencing and social distancing in the context of the pandemic. The latter, in particular, it was very difficult to implement in an environment that is designed for personal contacts. However, we are confident that NUKEM Isotopes GmbH will emerge stronger from this crisis.



Road to success







Key personal at NUKEM Isotopes



Michael Kievel

Chief Sales Officer (CSO)

+49 6023 9474 802

Michael.Kievel@nukemisotopes.de



Carmen Leisherer

Senior Manager Sales & Export Control

+49 6023 9474 805

Carmen.Leisherer@nukemisotopes.de

Michael and **Carmen** are responsible for sales at NUKEM Isotopes. Customer care, processing of inquiries and the preparation of offers are among their main tasks. Together with the Team in the back-office, they are focused on guaranteeing the company's success. In addition, you will find the right contact person here for any questions about import / export as well as business figures and contract details for all products.



Tilo Gläser

Chief Operating Officer (COO)

+49 6023 9474 808

Tilo.Glaeser@nukemisotopes.de



Christian Schuch

Senior Manager Business Development

+49 6023 9474 804

Christian.Schuch@nukemisotopes.de

Tilo and **Christian**, who have studied, respectively, physics and chemistry, are the contact people at NUKEM Isotopes for all questions regarding quality management, product properties and marketing. They are also responsible for the development of new business segments and products.



Daniel Plumpe

Director Controlling

+49 6023 9474 801

Daniel.Plumpe@nukemisotopes.de



Astrid Betz

Assistant to the management

+49 6023 9474 800

Astrid.Betz@nukemisotopes.de

Daniel is the latest member to join our team. He has already gained controlling experience in the field of energy trading and works closely with our CFO to focus on key economic issues of the business.

Astrid is not only the assistant to the management, but also the office manager at NUKEM Isotopes. This makes her the necessary oil that keeps the company running smoothly.



Ulf Jeschke

Chief Financial Officer (CFO)

+49 6023 9474 819

Ulf.Jeschke@nukemisotopes.de



Britta Winkel

Manager Accounting/Controlling

+49 6023 9474 808

Britta.Winkel@nukemisotopes.de

Ulf and **Britta** are our number crunchers.

They are our experts on tax issues as well as the people in charge of keeping our company's figures straight and ensuring that all incoming and outgoing invoices are paid on time.



Sebastian Heininger

Senior Manager Shipping & DGR
Specialist

+49 6023 9474 807

Sebastian.Heininger@nukemisotopes.de



Michael Saur

Manager Shipping

+49 6023 9474 806

Michael.Saur@nukemisotopes.de

Without **Sebastian** and **Michael**, you would never receive our products. No matter which product, or which place on earth; the two of them make sure that our products arrive safely and quickly to our customers and furthermore make sure that our product warehouses are always sufficiently stocked.

NUKEM Isotopes at international exhibitions

Prior to the foundation of **NUKEM Isotopes GmbH**, we had already participated in several international exhibitions. As the world's leading supplier of boron-11 and germanium-72, the semiconductor-related trade fairs were obviously our focus.

However, due to the growing demand for isotopes for nuclear magnetic technology, we also focused on trade fairs that use stable isotopes for medical purposes. The annual EANM (European Association of Nuclear Medicine) and ISMRM (International Society of Magnetic Resonance in Medicine) exhibitions are particularly worth mentioning here. To promote our products and our co-operations with various research institutes, we were not only visitors at these fairs, but also exhibitors for several years.

On the following pages you will find some impressions of our trade fair visits in recent years.

Impressions from trade fair visits

Every year we ship the individual parts of our booth from Alzenau to the different venues for the trade fairs. Arriving there, we initially find a perfectly packed package (bottom left) and an empty space with our name in the exhibition hall. Then it's time to set up the booth. So, tools out and the more than 100 parts and countless LEDs are brought to the right position (bottom right).



Below left you see Christian Schuch, Tilo Glaeser and Michael Kievel in front of our latest exhibition design. In reality the presence of the backlighting is even more noticeable than here in the pictures. On the right-hand side, you see our Managing Director Wilhelm Plumpe (on the right) and on the far left his wife Gudrun Krafczik, who often take the opportunity at trade fairs to meet with several of our customers in person. They are always ready to lend a helping hand to the trade fair team with setting up or dismantling our booth. Next to Gudrun you can see Carmen Leihner, who has been strengthening our trade fair team with her expertise in import and export for several years now.



Nothing is more effective and exciting than taking the opportunity to exchange ideas with customers at trade fairs and to present our high-quality products to an interested audience. Here you also have the chance to talk about new projects or future developments in a more private atmosphere. The organizing committees of the events often select the most beautiful spots of our planet for their events.

Here you can see, for example, the NUKEM Isotopes trade team at the 2017 ISMRM which took place in Honolulu, Hawaii.



Our exhibitor booth wall (at EANM and ISMRM)

The $^1\text{H}/^{17}\text{O}$ -MRI images and diagrams on our wall (top, left side) were, thankfully, provided by the German Cancer Research Center (DKFZ), Heidelberg, Germany and University Hospital Erlangen, Erlangen, Germany.

The displayed images and diagrams are part of an ongoing study and are presented at the ISMRM in the abstract entitled “Metabolic Rate of Oxygen Consumption in Brain Tumors: A pilot ^{17}O MRI study”.

In addition, the MRI lung images (on the right side) were, gratefully, provided by Duke University, Durham, NC, USA (Bastiaan Driehuys) and the image of the Xe-129 Polarizer was gratefully provided to us by our business partner Polarean.



Our ISMRM rubber duck family



Dr. Jacques
Montreal 2019



Dr. Amy
Paris 2018



Nurse Xenia
Hawaii 2017



Nurse Gudrun
Singapore 2016



Dr. Willy
Toronto 2015



Nurse Alberta
Salt Lake City 2013



Nurse Roberta
Melbourne 2012



Dr. Bob (Robert)
Montreal 2011

Above you see our rubber duck family, which are our giveaways since the founding of NUKEM Isotopes on the previous ISMRM exhibitions. The rubber ducks are not for sale and only available on the ISMRM at our booth.

Christmas at NUKEM Isotopes



Just as Christmas comes every year, we at NUKEM Isotopes have rituals that we perform. There is the usual Christmas party with the entire team, and

when possible, together with the shareholders of our company. A meal and a cozy get-together are obligatory. From time to time, more special events are planned, like the organized transport to a chosen restaurant in a party bus (upper right picture).

The second tradition which has existed for **30 years** is when the complete team, including former colleagues, are invited to the same rustic restaurant for a chicken dinner (bottom right).



Services, quality and philosophy at NUKEM Isotopes

The NUKEM Isotopes Team combines both technological and commercial background and long-term experience in the Isotopes trading business. Our key personnel have a combined working experience of over 100 years in trading isotopes. With qualified chemists and physicists, trained sales personnel, and specialized shipping experts, we can guarantee our customers a reliable and quick supply of our products.

With our warehouses at Frankfurt Airport, Hamburg seaport and cooperation partners in USA, we are able to ship our isotopes within 48 hours to our clients worldwide.

- We provide supply security based on our multiple, audited production sources worldwide.
 - We provide professional packaging, documentation and shipping services.
- We are fully accredited to DIN ISO 9001-2015 by BSI Management System.



Main products at NUKEM Isotopes GmbH



Enriched Lithium-7 Hydroxide Monohydrate for use as an alkalizing agent in pressurized water reactors.

Our **Lithium-7** is specifically designed to meet the quality requirements of the nuclear power industry (among others US standard 10 CFR 50 Appendix B and 10 CFR 21). In addition, our Li-7 undergo an independent quality check by, accredited laboratory to guarantee the high quality.



Boron-11 trifluoride gas is the ideal silicon wafer dopant for the production of highly integrated, high-density microchips. $^{11}\text{BF}_3$ provides for greater efficiency (by minimizing the so-called soft error effect) and increased production throughput, and helps to make chips smaller and better.

Main products at NUKEM Isotopes GmbH



Nitrogen-15 is used to produce ^{15}N -labelled chemical compounds for medical, biomedical and different research applications as well as improving the harvest in agriculture.

Nitrogen-15 in the form of gas ($^{15}\text{N}_2$) has the potential as a lung imaging agent due to its comparable properties to air and helps to understand the complex processes of N_2 fixation.



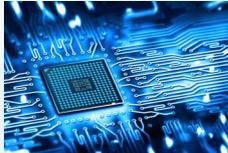
Oxygen-17 (^{17}O) is now used for diagnostic applications in medical research to create a new generation of NMR Images.

New developments with ^{17}O , enrich the quality of information about living tissue to enhance the practice of medicine in the fields of cardiology and neurology among others.

Main products at NUKEM Isotopes GmbH



Oxygen-18 is used to create tailored organochemical compounds labelled with the radio isotope ^{18}F (for example, 2-fluoro-2-deoxy glucose [^{18}F FDG]). These are used for Positron Emission Tomography (PET), the latest cancer diagnostic technique.



Enriched Germanium-74 in the form of Germanium Tetrafluoride gas is used as pre-amorphous implant to prevent silicon wafer from implant dopant channeling. Furthermore, it is used to strain silicon wafer which optimizes the performance and speed of the device.



Hyperpolarized Xe-129 makes it possible to capturing high-resolution, 3D images of the lung using a conventional MRI scanner. Due to the varying solubility of Xenon in different environment, it is additionally possible to illuminate organ functions and tissue characteristics in a total way.





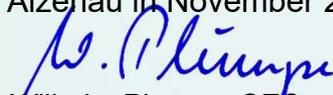
10 years in a flash

Looking back, the past **10 years** have been characterized by challenges, adaptability and the endeavor to always give our best. NUKEM Isotopes would like to continue to be a reliable partner for our customers, suppliers, friends and a good employer for its personnel. Even if NUKEM Isotopes is only celebrating its **10th anniversary** as an organization, the majority of employees have decades of experience in Isotopes Trading. During this time, NUKEM Isotopes was able to establish itself as one of the world's leading companies in this field. We want to use this know-how to guarantee a future-proof job for the next generation and to grow together.

Changes are just as much a part of this process as reflecting on the roots.

Many thanks to everyone who has helped with this development so far, especially the members of the advisory board, who always support the management of NUKEM Isotopes in their decisions with advice and action.

Alzenau in November 2021


Wilhelm Plumpe, CEO



NUKEM Isotopes GmbH

Rodenbacher Straße 47,
63755 Alzenau, Germany

E: info@nukemisotopes.de

T: +49 (0) 6023 9474 800

www.nukem-isotopes.de