

# Palas® expands business field nanotechnology



► With a new department Palas® extends its know-how to the measurement of ultra-fine and nano particles.

Jürgen Spielvogel, Division Manager Environmental Monitoring & Nano Instrumentation, and his assistant Julia Ohmenzetter recently joined the Palas® team. ► [Read more on Page 4](#)



Dear Readers,

► We want to expand our service and to network even better with our clients and partners. A few weeks ago our new online customer portal was launched. This portal grants you a direct and fast access to information and support concerning your Palas® product. For example, we allowed for the software of your application to be updated quasi at the push of a button. From now on, technical support is possible directly at the device – everything you need for the new service is an Internet connection.

Since the early days of our company we have closely worked together with universities and research institutions. The project at the KIT – Institute for Technical Thermodynamics and Low-Temperature Technology described in this issue is an example on how we exchange knowledge and technology. In particular the cooperation with Dr. Heinz Umhauer has contributed significantly to the development of the optical particle measurement devices of Palas®. In this issue we look back on nearly three decades of lived knowledge and technology transfer.

Leander Mölter  
Managing Director of Palas® GmbH

## Further topics in this issue:

### ► Researchers at KIT are testing sulphuric acid mist

Employees of the Institute for Technical Thermodynamics and Low-Temperature Technology work on the characterisation of sulphuric acid aerosols in combustion processes. Thereby, Palas® measurement and dilution technology is used. ► [Page 2](#)

### ► Application spectrum of the Palas® products further expanded

Innovations and developments in the fields of nano measurement technology and filter testing

- **UF-CPC condensation particle counter** for particle number determination in aerosols from 5 nm up to 10 µm
- Aerosol electrometer **Charme®** - measurement of the aerosol concentration from 2 nm up to 100 µm
- **Filter test rig MMTC 2000** with new software
- **Complete filter test rigs according to EN 779 and ASHRAE 52.2**
  - combined know-how in the areas aerosol technology and ventilation technology
- New **online service portal** for Palas® users
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### ► 27 years of lived knowledge and technology transfer

The cooperation with universities has played an important role since the foundation of Palas®. Especially the cooperation with Dr. Heinz Umhauer of the Technical University Karlsruhe is the basis of successful product developments. ► [Page 4](#)

# Researchers at KIT are testing sulphuric acid mist

Measurement and dilution technology made by Palas® makes the determination of the number density of volatile aerosols possible.

► With which methods can sulphuric acid aerosols be characterized during combustion processes? Employees of the Institute for Technical Thermodynamics and Low-Temperature Technology at the Karlsruhe Institute of Technology (KIT) deal with this question.

Sulphuric acid aerosols are generated during the scrubbing of flue gases after industrial combustion processes (for example in coal-fired power stations and incineration plants), during processes where ores are solubilised with sulphuric acid as well as in the chemical industry. The mists arising during the absorption of the acid reduce not only the efficiency of the separation process, but can also lead to corrosion in separation systems and to exceeded emission limits. At present there is still no solution how to separate the acid mists purposefully and energy-efficiently - system operators can so far choose between very expensive wet electric filters or glass-fibre filters that lead to a high pressure loss and thus to an increased energy input.

## Sulphuric acid absorption: "One breaks a fly on the wheel!"

"With the separation one mostly breaks a fly on the wheel", explains Prof. Dr.-Ing. Karlheinz Schaber, head of the Institute for Technical Thermodynamics and Low-Temperature Technology. At a flue gas purification system of the Institute, which exists in this form only in Karlsruhe, the Ph. D. student Leonie Brachert examines at present how sulphuric acid aerosols can be characterized during technical processes.

The won results are to make statements possible related to a more effective process-technical handling of the critical mists. "We aim to develop a new method how to completely determine the sulphuric acid aerosols regarding the number density, droplet size distribution and acid concentration on the drops", says Ms. Brachert. Together with Dr. Sokratis Sinanis who is in charge of the aerosol research at the Institute, she gave a paper on this project at this year's Palas® Aerosol Technology Seminar. In addition, Ms. Brachert wants to examine experimentally the nucleation of sulphuric acid aerosols in flue gases on the basis of theoretical findings.

The volatility of the aerosols changing their condition when they are diluted and the state of the sulphuric acid mists pose a measurement-technical challenge. These are character-



Dr. Sinanis, Dipl.-Ing. Brachert and Prof. Schaber in front of the flue gas system of the KIT. The measurement system consists of a Palas® dilution cascade DC 10000 iP, a welas® CNC module and an aerosol spectrometer welas® 2000 with control unit and aerosol sensor welas® 2070.

ised by a very fine distribution with droplet sizes < 200 nm and an extremely high number density of up to  $10^9/\text{cm}^3$ . The sulphuric acid mists can neither be completely characterized by sampling, nor are there other adequate measuring methods. "If such a sulphuric acid droplet has a size of e. g. 100 nm and a concentration of 16 % sulphuric acid, about 80 % sulphuric acid is left over after an evaporation", explains Prof. Schaber. Only the number density can be seized. If this one is well-known, the growth and the droplet size distribution within the individual phases of the process are calculated with a particularly developed simulation tool. In order to determine the number concentration of the chemical-aggressive mixture, the scientists use a measuring system with a condensation particle counter and a dilution cascade with the factor 10,000 made by Palas®. The combination of a welas® aerosol spectrometer with a welas® CNC module enables to cover the large measuring range. First measurements already confirmed the suitability of the setup.

An intensive exchange has already existed for nearly 15 years between the Institute and Palas®. "During former measurements of sulphur aerosols with our three-wavelength extinction equipment there was always a discrepancy between the measured and the calculated results", reports Prof. Schaber when explaining how the cooperation relative to the current project had begun. On closer inspection a fine fraction with droplets < 50 nm was detected. The researchers had first not recognized this fraction. Thereupon Palas® made a dilution sys-

tem available in order to measure the number density. Thus it was determined that more particles had been measured than presumed. "That is most interesting", points the head of the Institute out. The task of Ms. Brachert is to generate a loadable data set of number densities making further statements concerning the condition of the aerosols possible.

## In the industry there is a need for optimized separation processes

"As soon as we can produce the sulphuric acid in well-known concentrations, we will start with the actual measurements", says Ms. Brachert when explaining the current half-time status of the two-year research project. A further question could be with which methods the fine particles can be finally separated with a possibly small energy input. "Such aerosols exist everywhere in the industry, beside sulphuric acid there are for example also mists from hydrochloric acid or mixed aerosols", explains Prof. Schaber whose Institute is well prepared for extended experiments. "With the flue gas system we can produce reproducible mists to test separators and we have some ideas how separation processes can be optimized."

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# Application spectrum of the Palas® products further expanded

Progresses of approved procedures enable Palas® to offer new solutions for the generation and dosage of aerosols. The product spectrum concerning the particle measurement technology has been optimized as well.

## Nano: UF-CPC Condensation Particle Counter - Particle number determination in aerosols from 5 nm up to 10 µm

► This new ultra-fine and nano condensation particle counter (UF-CPC) offers significant advantages for applications in research and also for measurements in the chemical industry. Thus, models for temperatures and pressures being different to ambient conditions as well as for aggressive aerosols like condensed hydrochloric acid droplets are available.

For the first time, the universal fluid UF-CPC allows a change of the working fluid, e. g. from butanol to isopropanol or water by the user in a short time. Other parameters, e. g. the saturator and condenser temperatures can be changed via the advanced menu. Since the UF-CPC also measures the size distribution of the droplets, the user gets additional information about the condensation process. The number concentration can be determined up to 1,000,000 P/cm³ in the single counting mode. The UF-CPC supports network connectivity with remote operation and data storage online and comes with an integrated interface for process control applications. This user-friendly UF-CPC is further characterized by an intuitive user interface through the 7" touch display and flexible software for data evaluation and data logging.



Condensation Particle Counter UF-CPC



Aerosol Electrometer Charme®

## Filter test rig MMTC 2000

► The filter test rig MMTC 2000 approved in the practical application has been expanded by new features. Thus, the MMTC offers now new Windows software for filter testing according to VDI 3926. Depending on the customer requirement, the filter test rig can be equipped with a flexible adjustable sequence programme for the measurement procedure. The MMTC allows a detailed analysis of all data like residual pressure loss, cycle time, dust emplacement as well as the gravimetric and optical measurement of the particle emission. Also new is an integrated online measurement of the particle emissions in the clean gas with the aerosol spectrometer system Promo® for process controlling in highest temporal resolution. Thus, also particle emissions can be evaluated during the dedusting.

## Complete filter test rigs according to EN 779 and ASHRAE 52.2

► Since this year, Palas® offers again complete filter test rigs according to EN 779 and ASHRAE 52.2. The test channels are developed in cooperation with specialists of the ventilation technology and adapted individually to the requirements of the customer. Thereby the users benefit from the combination of expert knowledge of the Palas® GmbH in the fields of aerosol technology and filter test rigs and the know-how of a channel manufacturer in the area of ventilation technology. In a preliminary acceptance of the total system, the perfect performance of the test rigs is always proven.

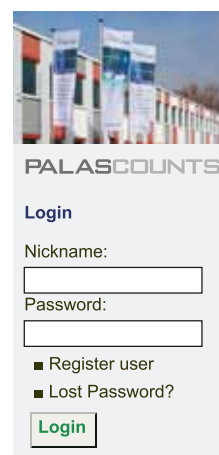
## Nano: Charme® Aerosol electrometer Measurement of the aerosol concentration from 2 nm up to 100 µm

► This mobile aerosol electrometer provides accurate measurements of electrical current that results from a continuous flow of charged aerosol particles. In cases when the individual charge on the particles is known or can be assumed, it reports the particle concentration in real time.

The removable gravimetric filter permits a correlation on site for the mass concentration. Application areas are e. g. environmental measurements, workplace measurements as well as the calibration of condensation particle counters. The portable device can be operated with battery. The Charme® has a 3,5" touch display and a comfortable user interface. It can be connected to the network via LAN or Wi-Fi and offers a flexible software for data evaluation and data logging. Measurements in the range from 1 fA – 22,500 fA with a volume flow of 1 to 8 l/min are possible.

## Service portal for Palas® users

► Palas® extends the online service for customers: Now users can log in with an individual password on the Palas® homepage and have direct access to downloads and updates. Then, online updates are possible. In addition, it is possible to connect devices with the server of the company. The user can inspect the status of the device only with a secured access of the Palas® homepage. If required, the customer can transmit the status of the device by push on a button – so the Palas® specialists can maintain the devices online and provide direct and fast support. The online service is easy. The devices are registered automatically per DHCP, the user has just to confirm with a click. In the next issue of Palas® Particular, we will present the new customer portal more detailed.





## 27 years of lived knowledge and technology transfer

► The characterisation of sulphuric acid mist at the Institute for Technical Thermodynamics and Low-Temperature Technology about which we report in this issue, is the most recent example for the close professional exchange between the Technical University Karlsruhe, today KIT, and the Palas® GmbH. "The long lasting co-operation has complemented our product development essentially", says Leander Mölter, Managing Director of Palas® GmbH. The actual product spectrum proves also how important the cooperation between universities and companies is in order to ensure and to use a knowledge and technology transfer.

Already the foundation of Palas® GmbH was closely connected with the University of Karlsruhe. In 1983, Mölter and his team laid the foundation stone for the economical success of the young company by the further development, production and commercialization of the solid particle disperser RBG 1000 with rotating brush of Professor Friedrich Löffler. Palas® obtained the innovation award of the federal state Baden-Württemberg for this product. In 1986, a cooperation was arranged in the field of particle measurement technology with Dr. Heinz Umhauer of the Technical University Karlsruhe – the idea came up at a



Dr. Heinz Umhauer of the Technical University Karlsruhe and Managing Director Leander Mölter

meeting of Mölter and Umhauer in front of the historical backdrop in the Reichstag (today's German parliament) at the Berlin Wall in the course of the European Aerosol Conference (EAC). "Even today we benefit from this co-operation", accentuates the Managing Director of Palas®. "Here the basis was provided that the technology of the optical particle measurement technology, determination of particle size and particle number regarding to procedural applications could be further developed." Today the further developed optical particle measurement systems welas® digital,

Promo®, Fidas® and Inas® permit to determine reliably and reasonably particle sizes and particle numbers in the environment, in high temperatures, in high pressures and in chemical aggressive gases. Not least, it is due to the co-operation with the University of Karlsruhe that the Palas® GmbH has evolved into the market leader in the area of optical aerosol spectrometers and filter test rigs.

► Under [www.palas.de](http://www.palas.de) you can learn more about the history of the optical measurement technology with white light.

## New department at Palas® for Environmental Monitoring & Nano Instrumentation

► Palas® intensifies the development and distribution of products for particle measurements in the area of nano instrumentation and created therefore a new department. Division Manager is Jürgen Spielvogel. The expert for Environmental Monitoring & Nano Instrumentation with international experience joined the Palas® team 01 October 2010. "It is my objective to establish Palas® under the leading companies for nano particle measurement", explains Spielvogel whose main focus is on the distribution and marketing. In addition, he will contribute his experience in the particle measurement technology to the development of the products.

After his studies in physics he completed his Master in Applied Optics in the USA and – in this context – spent several months in Japan. Spielvogel worked in the field of optical particle counting in the USA for various years before he returned and took the responsibility for the division Nano Instrumentation of an aerosol technology company in Germany in 2007.

**"Product quality is very important to me"**

The contact to Palas® came into being due to Spielvogel's activity in an ISO working group

for particle measurement technology in which Managing Director Leander Mölter is also presented.

"Especially the product quality convinced me at Palas®, an aspect that is very important to me", says Spielvogel. "I am very impressed by the many innovative ideas which are in the products. Now it excites me to carry out into the world the solutions that are worked out here in Karlsruhe." For the new job, the 42-year-old,

his wife and the two eight- and three-year-old children moved from Freilassing to Karlsruhe. Jürgen Spielvogel is assisted by Julia Ohmenzetter who works at Palas® since 01 September 2010. The International Management Assistant graduated as European Secretary and speaks English, French and Spanish. The 26-year-old looks especially forward to the new challenge in a dynamic and international environment.

### ► PALAS® AGENDA

**Palas® attends regularly conferences and exhibitions. The up-to-date details can be found on our website: [www.palas.de/exhibition](http://www.palas.de/exhibition)**

We already booked a stand at the following events:

- **Filtech 2011, Wiesbaden, Germany, 22.-24.03.2011 (Stand: F6 in the foyer)**
- **Index 2011, Geneva/Switzerland, 12.-15.04.2011 (Stand no. 4218)**
- **Powtech 2011, Nuremberg/Germany, 11.-13.10.2011**

**Please reserve: "Jubilee-ATS"**

- **25th Aerosol Technology Seminar , 12th and 13th of September 2011 (in German language)**

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