Thermal Analysis

onset

September 2003

With the New DSC 204 F1 *Phoenix*® in the Pole Position

Figure 1. DSC 204 **F1** *Phoenix*®

Precise, high-performance DSCs have so far been considered incompatible with robust and flexible "work horses" for rough, day-to-day industrial routine. With the new DSC 204 **F1** *Phoenix*®, the "Formula 1" among DSC systems, NETZSCH-Gerätebau has bridged this gap. Users can select from among three different sensor types especially tailored to their needs: the robust σ-sensor for universal use in the polymer field, the fast τ-sensor for optimum separation of overlapping DSC effects, and the highly sensitive μ-sensor for detection of the smallest phase transitions and impurities, particularly in the field of pharmacy.

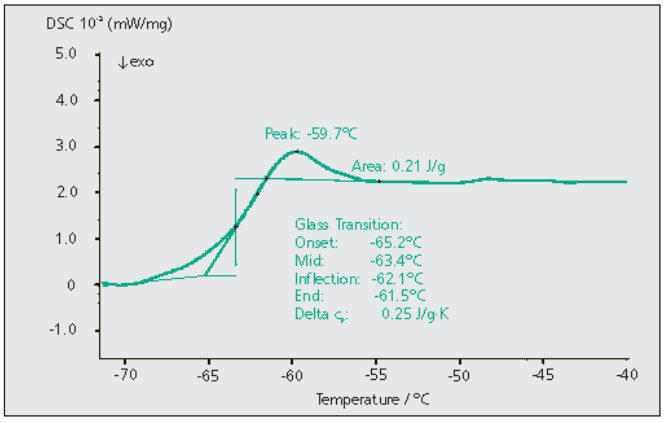


Figure 2. Glass Transition of a Natural Rubber Mixture

The intelligent and freely selectable baseline correction software, *BeFlat*®, enables the creation of perfect horizontal baselines by means of a multidimensional polynomial as a function of temperature and heating rates. This guarantees a high reproducibility and dramatically improves the detection limit of small and/or broad energetic effects.

With the newly developed compressor cooling, the temperature range from -85°C to 600°C can be covered. Therefore, even elastomers in the low-temperature range can be measured.

As an example, figure 2 shows the evaluated glass transition of a natural rubber mixture at -63°C (midpoint). The entire temperature range of the instrument spans from -180°C to 700°C when employing liquid nitrogen cooling (LN_2).

An electronic flow control system guarantees a precise gas flow of the various purge and protective gases. The **F1** can be equipped with the automatic sample changer, **ASC**, with which up to 64 sample crucibles can be employed automatically in any user-defined succession. For unstable samples, a piercing device is available which opens the tightly closed aluminum crucibles immediately before starting the measurement. An individual measuring and evaluation macro of the 32-bit *Proteus*® software can be assigned to each sample.

The **ASC** can optionally be employed with the new thermobalance, TG 209 **F1** *Iris*®, which presents an ideal thermoanalytical supplement to the DSC.

Contents

The new DTA 404 PC *Eos*®

Figure 1. The new DTA 404 PC *Eos*®

For decades, Differential Thermal Analysis has been an established method for characterizing phase transitions and decomposition reactions.

With the new DTA 404 PC *Eos*®, NETZSCH-Gerätebau offers a high-quality measuring system at an attractive price.

With this instrument, measurements between room temperature and 1550°C can be carried out. The robust air-cooled SiC furnace guarantees a long lifetime as well as fast heating and cooling cycles. The system is designed for operation in a dynamic gas atmosphere. Evolved gases from the sample can therefore easily be removed from the system by means of the gas outlet.

The DTA 404 PC *Eos*® can be equipped with sturdy DTA sensors which can be exchanged by the user within a few seconds. For the quantitative investigation of transition enthalpies, various DSC sensors are additionally available which allow, for example, accurate determination of the heat of fusion.

Figure 2 shows the measured energetic effects of a kaolin raw material. The typical endothermal dehydration (between 400°C and 650°C) and an exothermal solid-state transition (between 950°C and 1000°C) are visible in the curve. The additional effects at 255°C and 1235°C are caused by the influence of impurities.

Want to know more? Please contact us for more details or measuring examples for this new instrument.

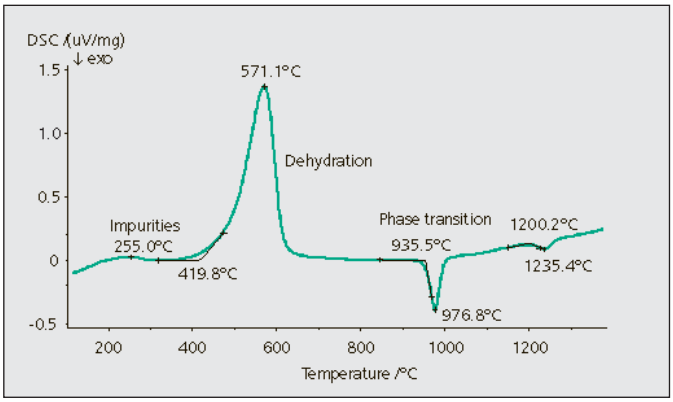


Figure 2. DTA Measurement on a Kaolin Raw Material

IPI - Competence in Process Mass Spectrometry

One of the main themes of our last ONSET edition focused on the 403 *Aeolos*® mass spectrometer. This product results from the successful cooperation of NETZSCH-Gerätebau and InProcess Instruments Gesellschaft für Prozessanalytik mbH (Society for Process Analysis), IPI for short.

Today, we would like to briefly introduce our partner in the field of mass spectrometry.

InProcess Instruments, founded in Bremen, Germany, in 1997, has specialized in the development of customer- and applications-specific gas analysis solutions in industry, research and laboratory. The application field spans fully-automatic process control in the steel and chemicals industries, trace analysis in the gas industry and analysis of the smallest of gas inclusions in glass.

In research, the focus is mainly on catalysis and fuel cells, but also on the investigation of carbon and nitrogen cycles by measurement of the isotopic composition as well as on gas species analysis in soil science and botany.

The mass spectrometer measuring technique is based on the quadrupole systems by Inficon AG (formerly Balzers AG), Liechtenstein.

IPI's team of thirteen employees including natural scientists and engineers works continuously on the further development of the MS systems with guaranteed world-wide technical support.

The company's strength is its individualized attention to and support for customers in process integration and analytical questions.

Due to the increasing turnover, the originally rented premises soon became too small. At the beginning of July 2003, IPI moved into a new building at the Bremen Airport. At 785 m^2, the space for offices, storage and laboratories has nearly doubled and offers enough room for further growth.

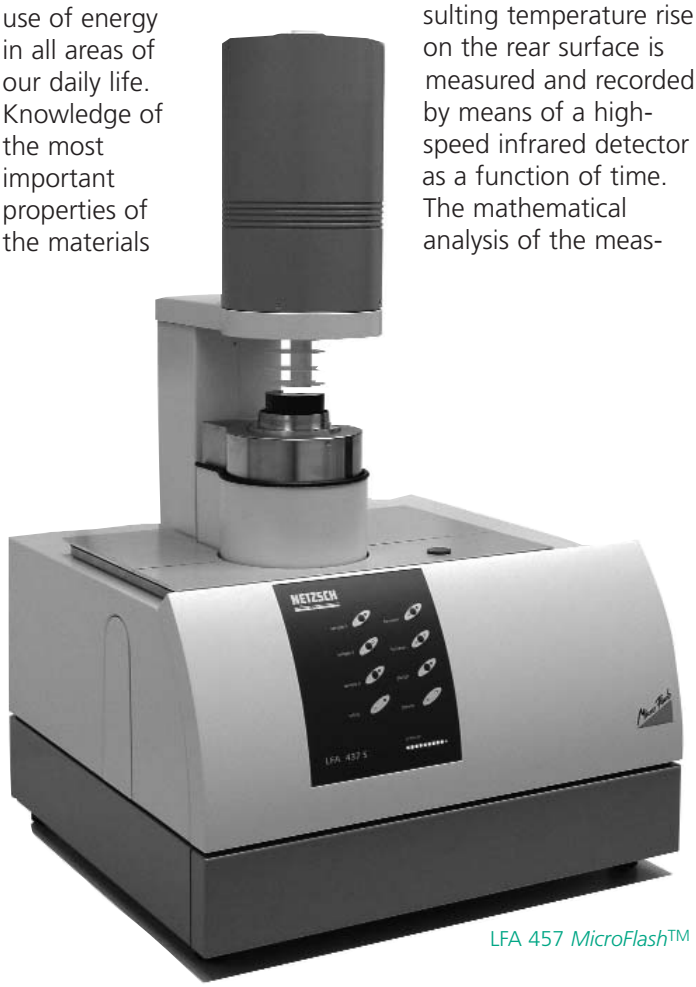
For more details on IPI, go to *www.in-process.com*.

NETZSCH

The LFA 457 *MicroFlash*™

NEW!

Protection of the environment also means saving energy. This will influence future technical innovations more and more. It is becoming compulsory to make the most efficient use of energy in all areas of our daily life. Knowledge of the most important properties of the materials to be employed is an absolute must for these development tasks.



LFA 457 *MicroFlash*™

Included at the top of such a materials properties list are thermal diffusivity and conductivity. Of the various available measuring methods, the flash method has distinguished itself as an almost ideal tool; this fast, non-contact and absolute measuring technique, with its high accuracy and wide application range, has convinced both engineers and scientists of its value.

The front side of a plan-parallel sample is heated by a short but intense laser pulse (flash). The resulting temperature rise on the rear surface is measured and recorded by means of a high-speed infrared detector as a function of time. The mathematical analysis of the measured detector signals allows the determination of the thermal diffusivity, which can then - along with the knowledge of the specific heat (c_p) and density (ρ) of the material - be used to compute the thermal conductivity.

With the newly-developed LFA 457 *MicroFlash*™ , covering a temperature range from -100° to 1100°C, NETZSCH-Gerätebau has further extended its flash instrument product range. The entire array of materials, from insulators to polymers to high-conductive metals, graphite and diamond, can now be tested on both single- and multi-layer systems.

The LFA 457 *MicroFlash*™ is equipped with an integrated software-controlled changer for up to three samples, which enables a high sample throughput. The vacuum-tight design of the instrument allows measurements under a defined gas atmosphere.

The solid-state laser, with a high pulse energy at a pulse duration of 330 µs, and an LN_2-cooled infrared sensor form the core of the instrument. The sample chamber is surrounded by a heating/cooling system which can be adjusted to the individual temperature range (-100°C…500°C...25°C... 1100°C); a motorized hoisting device moves the "furnace" for easy and comfortable insertion of the sample(s).

This instrument also comes equipped with state-of-the-art Microsoft® Windows®-based 32-bit software for measurement and evaluation, thereby meeting all requirements of technology and science.

Included here are self-optimising measuring modes, database-supported storage, pulse form correction, automated evaluation on the basis of various selectable mathematical models and determination of the specific heat, just to mention a few.

Regarding both the application field and the price, the LFA 457 *MicroFlash*™ perfectly bridges the "gap" between the recently introduced LFA 447 *NanoFlash*™, with its temperature range from room temperature to 300°C, and the universal LFA 427, a multivariable high-end system with measuring temperatures from -50°C to 2000°C.

Martin Schmidt

Technical Data of the LFA 457 *MicroFlash*™ at a glance:

- Sample changer (3 samples ∅ ≤12,7 mm)
- Temperature range: -100 to 500°C 25 to 1100°C
- Solid-state laser with a high pulse energy at a pulse duration of 330 µs
- Liquid nitrogen-cooled infrared sensor
- motorized hoisting device for the furnace
- modern, user-friendly 32-bit software

Trade Fairs, Symposia 03/04

We will be participating in the following exhibitions:

Ceramitec	16 - 20 September, Munich, Germany
NATAS	22 - 24 September, Albuquerque, USA
XLIII Congresso Brasileiro de Quimica	22 - 26 September, Ouro Preto, Brazil
Analitica	1 - 3 October, Sao Paulo, Brazil
6th Int. AVK-TV Conference	7 - 8 October, Baden-Baden, Germany
BCEIA	13 - 16 October, Beijing, China
Fakuma	14 - 18 October, Friedrichshafen, Germany
Mesurexpo	21 - 23 October, Paris, France
Innoplast-Seminar	4 - 6 November, Munich, Germany
7 ABPOL	9 - 13 November, Belo Horizonte, Brazil
Kemia 2003	11 - 13 November, Helsinki, Finland
Rich E Mac	25 - 28 November, Milan, Italy
ArabLab	9 - 12 February 2004, Dubai, U.A.E.

Retirement of Rudolf Lohse - Head of Sales Germany

Rudolf Lohse

After more than three decades of successful sales activities, Rudolf Lohse went into an early, but well-deserved retirement at the end of May 2003 for health reasons.

Due to his excellent memory and his good sense of the intricacies involved in the purchase of instruments, he contributed considerably to the success of NETZSCH-Gerätebau GmbH as a worldwide supplier of instruments for thermal analysis.

We wish him all the best and good health for this new phase in his life, which he wants to devote especially to his family and his three grandchildren.

by the way

The first two DEA seminars of NETZSCH-Gerätebau GmbH took place in March and May with huge success. Renowned experts like Dr. Ingo Alig, Deutsches Kunststoff-Institut (German Plastics Institute), Dr. Wolfgang Stark, Bundesanstalt für Materialforschung und -prüfung (Federal Institute for Materials Research and Testing) and Dr. Dale Gerth, DSM Composite Resins, lectured on dielectric analysis and its applications. In workshops, the seminar participants could, for example, experience demo measurements on a cured resin and carry out and evaluate measurements on an epoxy resin.

NGB in Poland

Grzegorz Seniuta

NETZSCH-Gerätebau is now also represented in Poland. The office of NETZSCH Instrumenty Sp.z.o.o. opened its doors on May 1st, 2003 in the beautiful, medieval city of Krakow in the south of Poland.

The coworkers, supervised by Grzegorz Seniuta, support us in the fields of software and micro-electronics.

New in Selb

Dr. Alexander Schindler

Dr. Alexander Schindler was born in Münchberg, Germany, in 1974. He studied physics at the University of Bayreuth where he received his PhD in the field of Experimental Solid-State Physics. He worked at Robert Bosch GmbH, Stuttgart, in the automobile electronics department (development of passive driving safety systems).

Since the beginning of 2003, Dr. Alexander Schindler has been employed in the applications lab at NGB with a special focus on both the STA product range and the *Aëolos*® and *Skimmer*® MS coupling systems.

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NETZSCH - the exact solution