

## Materials Characterization Excellence



TopTac™-2000

**점·접착력측정기**  
**Adhesion testing system**  
Texture Analyzer, micro UTM  
Materials Testing System

*Precision and High Quality, Made in Korea  
Produced by YEONJIN Corp.*

**가속속도열량계**  
**Accelerating Rate Calorimeter, es-ARC**  
**Battery Calorimeter, EV-ARC**  
Isothermal Battery Calorimeter, IBC, BPC  
Reaction Calorimeter,  $\mu$ RC, MRC™

*World Wide Bench Marking Products*



Micro RC      ARC



LT-451 / LTF631

**유전율분석기**  
**DEA, Dielectric Cure Monitor**  
(High Precision / High Speed)  
DEA sensors and MicroPress

*Very Qualified*

**열전도도/열확산율/열저항 측정기**  
**Thermal Conductivity Meter**  
Thermal Diffusivity Analyzer

*Customized for your needs*



FlashLine™-2000



PerkinElmer DMA8000      DSC4000/6000

**열분석기 (DSC, TGA, TMA, DMA)**  
*Various application for thermal analysis*



**Process Viscometer**



**고주파점도계**



**NanoFluid Thermal Conductivity Meter**



**Thermal properties solution provider!**  
**We serve only thermal properties solutions.**

**Find out more our high techniques**



(150-805) 서울특별시 영등포구 당산동 4가 32-141번지 연진빌딩 3층  
Phone: 02|2675-0508 (대표) A/S: 02|2675-0566~7 Telefax: 02|6918-6568

Copyright© 2011 YEONJIN Corp. Scientifics. Ltd. All Rights Reserved. Contact administrator for more information.

For more information, visit our website  
**www.yeonjin.com**

**주식회사 연진코퍼레이션**

(150-805) 서울특별시 영등포구 당산동 4가 32-141번지 연진빌딩 3층

Phone: 02-2675-0508 A/S: 02-2675-0566~7 Fax: 02-6918-6568 [support@yeonjin.com](mailto:support@yeonjin.com)

<http://www.yeonjin.com>

(주)연진코퍼레이션 취급 제품

<b>점착력측정기 / 재질분석기 / 식품물성분석기</b> (Adhesion testing system (ATS) / Texture Analyzer / TPA) TopTac2000™	5
<b>재료시험기 (UTM): 피로시험기 / 인장시험기</b> Fatigue testers / Tensile testers	6
<b>재료시험기 (UTM): 접착·박리시험기 / 압축하중시험기</b> Adhesion · Peel testers / Compression testers	7
<b>재료시험기 (UTM): 굴곡시험기 / UTM 악세사리</b> Flexural bending testers / UTM accessories	8
<b>열전도도측정기 / 열저항측정기</b> Thermal Conductivity / Thermal Impedance QuickLine™-10, Unitherm™-2022, QuickLine™-50	9
<b>열확산율측정기 / 열전도도측정기</b> Thermal Diffusivity / Thermal Conductivity Analyzer FlashLine™-2000, FlashLine™-3000, FlashLine™-4010, FlashLine™-5000	10
<b>열량계 Calorimeter</b> 가속속도열량계 Accelerating Rate Calorimeter, ARC EV-ARC 대용량배터리열량계, Multi-point BPC 마이크로반응열량계 Micro Reaction Calorimeter, uRC	11
<b>열팽창계수측정기 Dilatometer</b> Unitherm™-1000, DIL801, DIL802-, DIL803 Quenching / Deformation dilatometer; DIL805A/D	12
<b>점도계 High pressure Viscometer / High Temperature Viscometer</b> Quartz Laboratory Viscometer, Smallest sample volume 공정용 점도계 Quartz Process Viscometer 회전형 점도계 Rotation viscometer Fibre elongation viscometer / Beam bending viscometer	13
<b>Plastometer</b> Microscopic Hot/cold Stages, Hot/cold Chucks, Hot/cold Plates	14
<b>SThM (Scanning Thermal Microscope) 용 Thermal Probes</b>	15

<b>나노유체 열전도도측정기</b> Nanofluid thermal conductivity meter LAMBDA 2, LAMBDA 1	15
<b>고온시차주사열량계 High Temperature Differential Scanning Calorimeter</b> High Temperature DTA / DSC DSC/DTA701, DSC/DTA703	16
<b>열분석기 Thermal Analyzer</b> DSC/DTA, TGA/DSC TMA, DMA, DEA	17 18
<b>유전율분석기 Dielectric Analyzer</b> Dielectric Cure Monitor Reusable Dielectric Sensors Thermo-pneumatic press	19
<b>열분석기 샘플 팬 Thermal Analyzer Sample pan</b> 시차주사열량계 DSC Aluminum crucible (pan) 열중량분석기 TGA/DTA Alumina crucible (pan)	20
<b>오일시험기 Oil Performance Monitor</b> Gas Content in Oils / Water Quality Test in Oils Wax Flow Loop / Pipeline Restart Loop / Cold Fingers	21
<b>열분석서비스 Test service of Thermal Analysis (DSC, TGA/DTA/DSC, TMA, DMA)</b>	22
<b>열분석워크샵 Thermal Analysis Workshop</b>	23

For more information, visit our website: <http://www.yeonjin.com>

**주식회사 연진코퍼레이션**

(150-805) 서울특별시 영등포구 당산동 4가 32-141번지 연진빌딩 3층  
 Phone: 02-2675-0508 A/S: 02-2675-0566~7 Fax: 02-6918-6568 [support@yeonjin.com](mailto:support@yeonjin.com)  
<http://www.yeonjin.com>

# Adhesion testing system / Texture Analyzer

YEONJIN Corporation, Korea

## 점·접착력측정기, 재질분석기, 식품물성분석기

TopTac2000 series는 점·접착제의 *Steady Tension* 및 *Compression*, 일정한 거리를 반복 측정하는 자동 반복기능, 휨 정도를 측정하는 *Flexural test*, *Tack* 및 *Adhesion test*, *Creep testing*, *Stress Relaxation*,  $90^\circ$  ·  $180^\circ$  · *Peel-off* · *Loop tack test* 등의 점·접착력과 점탄성 특성을 측정하는 재질분석기입니다.

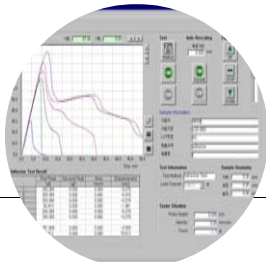
- 다양한 물성 테스트 모드
- 사용이 편리한 User Friendly Software

- Module 형 재질분석기
- 사용자 요구에 따른 기능 추가/수정이 가능한 자체 개발 국산 프로그램

- 자동 거리 조정 기능
- 점착특성 변화의 실시간 디스플레이

- 측정 결과의 평균값 · 표준편차 자동 출력
- Heating plate를 이용한 등온 조절

- 다양한 측정 jig
- 초당 최대 500개의 data acquisition



TopTac™-2000

### Tension testing

TopTac2000 series는  $0.1\mu\text{m}\sim 5\text{mm}/\text{sec}$ 의 작은 속도 하에서 Young's Modulus, Break Strength, Break Strain 및 Peel-off 측정과 전단응력 (Shear Adhesion) 등의 물성 측정이 가능합니다.

### Compression testing

TopTac2000 series는 저속에서 Hot-melt 점착제 및 Acryl 계 점·접착제 등의 압축탄성계수를 측정할 수 있습니다. 또한 압축 및 Bending (Flexure), Crack 시험 등을 통하여 일반적인 재질 물성을 구할 수 있습니다.

### Adhesive testing

TopTac2000 series는 저속의 Ball Tack 방식을 채용함으로써 Probe tack method에서 발생하는 오차요인을 제거하였습니다. TopTac2000A는 점착제의 초기 접착력(initial tack) 및 박리(peel-off)특성에 대한 물성값을 제공합니다.

### Creep Recovery testing

### Stress Relaxation testing

# Material Testing System (UTM)

TestResources, USA

## 피로시험기

### Fatigue Tester, Test Machine and Equipment

TestResources test machines feature a modular design approach which enables our engineers to configure optimized solutions to match test requirements, financial needs and buyer preferences. As a result of modularity, we can offer a wider range of choices than other test machine suppliers.

Fatigue test systems require the same capabilities as static machines but at higher speeds, increased power and superior control characteristics - hence they are more expensive. Fatigue testers can be used to characterize a material over a wider time spectrum or test rate, and are more likely to employ load and strain control waveforms and require specialized application software. The control system is the heart of a fatigue tester and more critical than in the case of a static test machine. Our servo controllers feature the highest resolution measurement and control in the industry.

They are also based on a very high speed DSP which is capable of operating up to 16 test stations simultaneously. Standard software performs standard tests and we offer special applications as required. The load frame, power pack and actuator are configured to match force, speed and travel requirements. We offer both electrodynamic (all electric) and servo hydraulic test frames with associated accessories (chambers, fixtures, extensometers).

A listing of industry standard tensile test methods is offered to support your needs. They can be purchased from standards organizations such as ASTM, ISO, BS EN, PSTC, Tappi, IPC, and CEN.



## 인장시험기

### Tensile Tester, Tensile Test Machines and Equipment

We configure a tensile tester or a tensile test machine from modules to match tensile testing needs, financial needs and user preferences. Because of modularity, we can configure a wide range of solutions compared to other test machine suppliers.

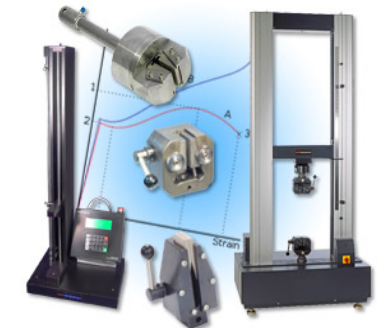
Tensile test machines are also known as universal electromechanical test machines. The frame should match test force, speed, stroke and travel needs. Our tensile test equipment choices include single column tensile testers, tensile bench style testers, and dual column tabletop or floor standing tensile machines.

Affordable standalone digital controllers perform standard tensile tests and can operate without a PC. Optional tensile software captures data and generates tensile test reports. These affordable solutions can perform standard tests.

Our flexible and powerful software controllers are well suited to high volume or demanding tensile testing applications. The R Series controllers are flexible and perform virtually any test.

Tensile test grips, clamps and fixtures are chosen to match the tensile test sample geometry and material. Our tensile test equipment is modular and expandable to perform compression, peel, tear, shear and bend flexural tests as well. Wedge action tensile grips are used for metals and composites testing applications. We supply many solutions made to special or one time tensile testing requirements. Extensometers and environmental chambers are also available.

Our tensile testing resources include information such as listing industry standard tensile test methods. Standards may be purchased from organizations such as ASTM, ISO, PSTC, Tappi, IPC, and CEN.



# Material Testing System (UTM)

TestResources, USA

## 접착/박리시험기

### Peel, Adhesion, Bond & Weld Strength Tester, Test Machine and Equipment

TestResources values the opportunity to assist you in configuring an optimally configured test machine or tester. Our applications engineers are available to support you - just contact us. Each test machine we provide is intended to meet specific user application requirements that vary from customer to customer.

Peel adhesion bond and weld strength testing applications are served by specialized test machines and testers configured to requirements. Our test equipment is modular ('lego-like') and made to match each users test requirement, personal preferences or budget. Popular peel testers or peel testing machine configurations include an affordable controller with a single column load frame (such as the 100P). Some applications require a wider test space and a dual column load frame. Some spot weld or metal peel testing applications require high forces (300 series test machines).

Controllers also vary from one situation to the next. Many customers are best served with a standalone controller where a PC is not required. Our software products are available in tiered capabilities to our highly flexible PC based controller (R Series) that can perform virtually any mechanical test with high performance and flexibility.

Each peel tester or test machine requires test fixtures to match specific test methods. Standard peel test fixtures match most peel test methods, sample sizes and materials. T peel or 180 degree peel grips, 90 degree peel fixtures, Rotating German wheel peel fixtures, floating roller fixtures, roller drums, and climbing drum peel fixtures are all available.

Call us for help in defining your exact needs. Peel testing methods are a good resource and we have listed some below. They are available from standards organizations such as ASTM, ISO, BS, PSTC, Tappi, IPC, and CEN.



## 압축하중시험기

### Compression Tester, Test Machine and Equipment

Compression test machines are configured by applications engineers to match your test force, speed, stroke, and travel requirements. Compressive test load frame choices include single column, bench or horizontal and dual column compression testers. Each compressive tester or compression testing machine is matched to test requirements, financial limitations and user preferences.

Each compressive test machine includes either a standalone or PC based digital controller. The standalone entry level controller features optional test software to capture data and generate a test report. The flexible and powerful software based R controller handles high volume or demanding compression test applications. Compression test platens, compressive plates, puncture fixtures, compression or indentation probes, jigs and cages are also chosen to match your test sample geometry and material.

Compression test equipment can be expanded to perform tensile, peel, tear, shear and bend flexural tests with the addition of application specific fixtures. Extensometers and environmental chambers are also available.



# Material Testing System (UTM)

TestResources, USA

## 굴곡시험기

### Flexural Bend Test Equipment

Flexural bending tests help characterize flexural strength, flexure stiffness and flexural modulus of materials such as ceramic, composites, wood, metals including steel and aluminum, glass, plastic, refractory materials and concrete. Flexural fatigue life and flexural materials property tests are also common to medical devices and electronics.

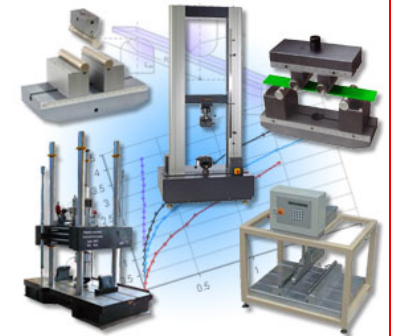
Information on flexural bend test machines, rigs, and apparatus with detailed test fixture requirements can be found in industry standard test methods available from organizations such as ASTM, ISO, EN, BS, DIN and AWS.

**Bend Flexural Test Machine** Universal or general purpose mechanical testers and test equipment can perform a flexural bend test when outfitted with a TestResources three or four point bending fixture.

New flexural bend testers are available and can be configured by a flexural bend test application engineer and optimized to exact needs. Many customers want to perform more tests than just flexural bending, including tensile, compression and fatigue tests. TestResources flexural bend fixtures can be fitted to TestResources test machines or machines of other suppliers.

**Test Definition and Reporting** Most flexural test standards define the steps needed to define tests and generate test reports. Test parameters include beam geometry, stress - strain properties, flexure stiffness, flexural modulus, modulus of rupture, bend strength, flexural fatigue, and flexural deflection or elongation.

**Special Flexure Bend Accessories** We offer the widest selection of flexural bend fixtures in the industry. A review of flexural test standards shows that requirements tend to vary widely. We offer 3 point bend fixtures and 4 point bend fixtures, articulating and nonarticulating, flexural tensile jigs, equi-biaxial bending or ringonring test fixtures, and jigs for reverse bending (tension-compression) fatigue fixtures. Bend fixtures are available for use in high and low temperature environmental chambers and biological baths. Deflectometers (LVDT or strain gage based) are available for accurate flexural strain measurement.



## UTM 약세사리

### UTM Accessories

TestResources test machine accessories are available for a wide range of mechanical tensile, compression, shear, flexural, peel, dynamic, and fatigue tests. They are adaptable to Instron® test machines or other test machines. This online catalog shows only selected models from our total product line, so call us with your requirements - we offer no charge applications support and engineered solutions.



# THERMAL CONDUCTIVITY

Anter, USA

## 열전도도측정기, 열저항측정기

**QuickLine™ -30** is a very low cost thermal properties analyzer with interchangeable surface and needle probes for a wide variety of materials in environments from  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ . Portable operation for field use or process control. Test times in minutes.

**MODEL 2022 Guarded Heat Flow Meter** for testing of polymers, ceramics, metals and other materials of low to medium thermal conductivity. Also capable of testing viscous fluids. *Temperature Range*  $-20^{\circ}\text{C}$  to  $300^{\circ}\text{C}$ . Available as a manually operated instrument or fully computerized system. Conforms to ASTM E1530.

**QuickLine™-10** is a lower cost guarded heat flow meter instrument for operation at ambient temperature. An automated version is available for QA applications. Conforms to ASTM E1530.



QuickLine™-50

**QuickLine™ -50** is a device specifically developed for measuring **interface thermal resistance of thin film**. It is based on a newly developed transient technique (patent pending) that is a magnitude faster than steady state measurements, and can also readily measure very low impedance combinations. *Temperature Range* RT to  $150^{\circ}\text{C}$ .



Unitherm™ Model 2022

**FireLine™ -1000** is a fully automated computer controlled instrument specifically designed to measure the thermal conductivity of certain fire resistive materials and general purpose insulating materials. It uses a **direct / absolute method** that requires no calibration. *Temperature Range* RT to  $1000^{\circ}\text{C}$

**MODEL 6000** Guarded Hot Plate for testing of thermal insulations and other materials of low thermal conductivity. Models cover ranges from  $-180^{\circ}\text{C}$  to  $550^{\circ}\text{C}$ . Sample size 300mm square, maximum sample thickness 75mm. Fully computerized system. Conforms to ASTM C177 and ISO 8302.

1700 Universal Road, Pittsburgh, PA 15235-3998 USA



# THERMAL DIFFUSIVITY

Anter, USA

## 열확산율측정기 / 열전도도측정기

**FLASHLINE™- 2000** is suitable for research and development programs, as well as quality control. It is easy to maintain and very economical to operate in terms of consumables. The pulse module is integral, forming a compact bench top unit. The output of the HSXD is channeled through a proprietary patented wave guide to any of the specimens. Pulse delivery through the wave guide produces outstanding flux uniformity that greatly improves the data. It covers a temperature range from RT to  $300^{\circ}\text{C}$ .



FLASHLINE™- 2000



**FLASHLINE™- 3000** is a moderately priced system for temperatures from  $-180^{\circ}\text{C}$  to  $1000^{\circ}\text{C}$ . It uses a high speed xenon discharge (HSXD) pulse source to test larger, coarse-grained materials (refractories, carbons, rocks, etc.) and composites. Multiple sample capability allows specific heat capacity measurement and thermal conductivity determination.

**FLASHLINE™ - 5000** series is a modular laser flash system that can be configured to satisfy the most diverse requirements from insulators to highly conductive materials. It can be supplied with one or several different furnaces to cover a temperature range from  $-180^{\circ}\text{C}$  to  $2700^{\circ}\text{C}$ , and to accommodate single or multiple specimens. The state-of-art high speed electronics and the extensive dedicated software based on the best available theoretical and practical foundations generated in the past twenty five years. Highly accurate specific heat capacity measurement and thermal conductivity determination.

1700 Universal Road, Pittsburgh, PA 15235-3998 USA



## CALORIMETRY

Thermal Hazard Technology, UK

### 열량계 - 가속속도열량계(ARC), 발열량계, 반응열량계



#### The Accelerating Rate Calorimeter; ARC™

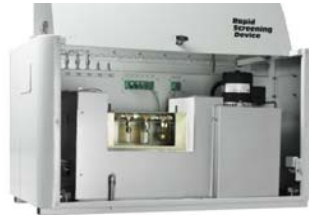
The world's benchmark adiabatic calorimeter. Giving full adiabatic runaway information for both temperature and pressure events. Also the EV-Accelerating Rate Calorimeter the worlds only purpose designed adiabatic battery calorimeter.

#### The EV-Accelerating Rate Calorimeter; EV-ARC™

The world's only purpose designed adiabatic calorimeter for batteries. Capable of looking at storage and EV batteries the EV-Accelerating Rate Calorimeter retains the high sensitivity and adiabacity of the original instrument.

#### Rapid Screening Device - RSD™

A new instrument to give you rapid access to exothermic data. This instrument allows you to run up to 6 samples simultaneously.



#### Micro Reaction Calorimeter - μRC™

A new reaction calorimeter - working with small volumes giving rapid and accurate enthalpy data and enabling rapid access to reaction kinetics.

#### Micro Multicell Calorimeter - mMC™

Our latest reaction calorimeter permits up to 8 samples (plus 2 reference) to be measured simultaneously. Ideal for excipient compatibility, food spoilage, microbial growth, denaturation and chemical stability studies.

www.thermalhazardtechnology.com

*thermal hazard technology*

## DILATOMETRY

Baehr-Thermo, Germany

### Quenching / Deformation dilatometer



This special dilatometer is used for the determination of deformation parameter and for the creation of continuous cooling and isotherm TTT-diagrams.

High heating rates of up to 4000K/s and cooling rates of 2500K/s as well as deformation rates of 0,01 to 125 mm/s are the main features. The following parameters are e.g. determined: deformation way, flow stress, strain rate, true strain, HF-power, change of length, temperature, time.

The entire electronics operate digitally and with an own processor system to control the HF generator, the hydraulic system, the measuring data recording, the gas supply, the vacuum units and the safety devices.

The professional 32-Bit software WinTA 9.0 runs under Windows® NT,2000, XP. An extensive software accurately and efficiently deals with both routine tasks and comprehensive evaluations. Export functions as tables in ASCII and Excel format as well as graphic file outputs in the formats BMP, JPG, TIF, EMF etc. enable a cross-platform work.

### 열팽창계수측정기 Dilatometer

We offer a wide range of various horizontally and vertically operating dilatometers for measurements in different temperature ranges. The high measuring accuracy and the comfortable handling form outstanding features. A very high quality standard has been reached by constant innovation, e.g. digital amplifier technique, 32-Bit software and a new temperature stabilization of the measuring heads. More than 900 satisfied customers use and measure with our dilatometers every day.



## VISCOMETER

Baehr-Thermo, Germany



Rotational Viscometer VIS403

Viscometers (high temperature) serve the measurement of the dynamic viscosity ( $\eta$ ) of materials with Newtonian behaviour of e.g. glasses, slags or mould powder.

As the viscosity of these materials changes over many decimal powers (1 to 1014,5 dPa s), it is only possible to record the complete range by using different measuring methods.

For this BÄHR-Thermoanalyse GmbH offers three viscometers for different temperature ranges.

**Rotation viscometer** 1 to 107,5 dPa s

**Fibre elongation viscometer** 108 to 1012 dPa s

**Beam bending viscometer** 109 to 1014,5 dPa s

## 고압점도계 (Pressurized viscometers)

F5 Technologie, Germany



Physical, rheological and thermodynamic properties of a fluid are determined by measuring the change pressure of a sample under applied volume change and at different temperatures: the p,V,T diagram.

**Pressure function**  
**Relative volume**  
**Specific volume**  
**Density**

**Derivatives  $aV / 0P$  and  $0P$**   
**Compression ratio**  
**Bulk modulus**  
**Strain relaxation times**

- The MicroPVT can be used to investigate **hydrate formation** and **paraffin content**.
- Linking the MicroPVT with a second unit can provide a **high pressure capillary viscometer**.
- The MicroPVT can be used to measure **wax crystallisation temperature and pressure** on live fluids and on petroleum products.

## PLASTOMETER

Baehr-Thermo, Germany

Plastometer serve the simulation in high temperature ranges of hot deformation processes (torsion, tension and pressure) for electrically conductive materials, such as steel, iron, non-iron metals. The plastometer is mainly used for the examination of the forge ability and for the simulation of rolling processes. High strain rates and a high true strain are distinctive features of this equipment.

Determined parameters

- deformation way
- torque
- angle of torsion
- flow stress
- true strain
- strain rate
- HF-power
- change of length
- temperature
- time



Plastometer STD810

## Thermal Hot/cold stages

Instec, USA



INTEC designs, manufactures, and markets high precision temperature controllers, microscope heating and cooling stages, and microscope warm stages, which have been used in a variety of research area.

INTEC also manufactures precision hot chuck systems, and thermal platform systems for probing, characterization, and failure testing of liquid crystal displays (LCDs) and semiconductor wafers.

**Hot/Cold Stages**  
**Hot/Cold Chucks**  
**Hot/Cold Plates**  
**LCD Instruments & LC Cells**

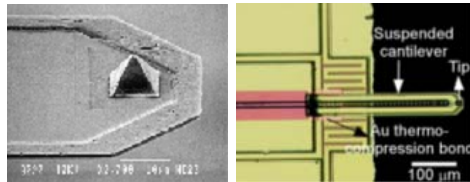
## SThM Thermal probes

PICOCAL, USA

PICOCAL is a technology-based venture whose objective is to provide novel measurement solutions to its customers. The company's first product is a MEMS scanning thermal probe that enables users to quickly and clearly view and measure thermal properties at the nanoscale. PICOCAL's products are designed to help researchers and manufacturers view critical characteristics that were not detected before. PICOCAL's team has more than 14 years of technical experience in scanning thermal microscopy and more than 20 years of microfabrication expertise.

In almost every technology there is a need for enabling instrumentation at the nanoscale. The fields that gain from PICOCAL's technology are: semiconductor, nanotechnology, biomedical, and advanced materials.

**Thermal Probes**  
**SPM modules**  
**SThM Technical Notes**  
**High Speed Probes**  
**Frictional Probes**



## 나노유체 열전도도측정기

F5 Technologie, Germany

By combining a high precision thermal conductivity sensor with an special heating device, a new standard on the field of thermal conductivity measurement of fluids could be set. The system is very suitable for measuring nanofluids. The measurement principle is based on a resistance measurement at a hot-wire with a diameter of only 100 μm.

- Optimization of fluid development
- Optimization of fluid application
- Quality control
- In-field Fluid analysis
- Nanofluids



## DTA/DSC 고온시차주사열량계

Baehr-Thermo, Germany



### DTA/DSC701

Sensitivity:	20μV/mW
Measuring range:	1μV - 100μV
Accuracy:	+/- 3,0%
Resolution:	T=0,05°C, ΔT=0,01°C
Signal time constant:	10 s
Atmosphere:	inert gas, air
Temperature range:	-160°C - 600°C; RT - 1450°C; 120°C - 1700°C
Heating rate:	0,01 - 20 K/min

The differential thermal analysis (DTA/DSC) serves the measurement of the temperature difference (ΔT) between a sample and an inert sample in function of the temperature (T).

The sensitive sensor and the homogeneous temperature profile are excellent features of this DTA/DSC.

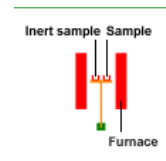
There is a good heat transfer between the DSC sensor and the sample crucible, whereas there is a high thermal resistivity towards the furnace room. This causes a high sensitivity and low time constants thus resulting in an exact determination of enthalpy, specific heat and transformation points.

The disc-shaped furnace shows an excellent and homogeneous temperature profile guaranteeing a straight and flat base line.

### DTA/DSC703

Outstanding features of this DTA/DSC are the newly developed sensitive sensor, the stable base line and high heating- and cooling rates.

There is a good heat transfer between the DSC sensor and the sample crucible, whereas there is a high thermal resistivity towards the sample room. This causes a high sensitivity and low time constants thus enabling an exact determination of enthalpy, specific heat and transformation points.



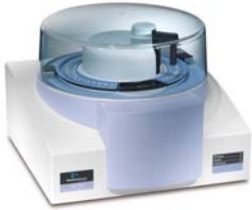
The bifilar-coil furnaces show an excellent temperature profile thus guaranteeing a very good base line. With cooling rates of 15 min (1400°C to 100°C) these furnaces are also designed for a high sample throughput.

Accuracy:	+/- 2,0%
Atmosphere:	vacuum, inert gas, air
Temperature range:	-160°C - 700°C; RT - 1450°C; 120°C - 1650°C
Heating rate:	0,01 - 100 K/min
Cooling rate:	1400°C to 100°C in 15 min



## THERMAL ANALYZER : DSC, TGA

### 시차주사열량계 \_ DSC



#### DSC Application

- Glass transitions
- Crystallinity
- Melting behavior
- Melting point
- Purity of materials
- Phase transitions
- Polymorphism
- Desorption and vaporization
- Chemical reactions
- Kinetics (e.g. curing)
- Thermal stability
- Specific heat capacity
- Ageing and thermal history

### 열중량분석기 \_ TGA/DTA

#### TGA Application

- 조성에 따른 질량의 증감 측정
- Evaporation, desorption (moisture), vaporization
- Thermal decomposition (pyrolysis, depolymerization)
- Thermal stability (열안정성)
- Oxidative degradation, oxidation stability (산화안정성)
- Compositional analysis (volatiles, polymer, carbon black, ash, filler)
- DTA application with TGA/DTA, e.g. Solid-solid transition
- DSC application with TGA/DSC, STA

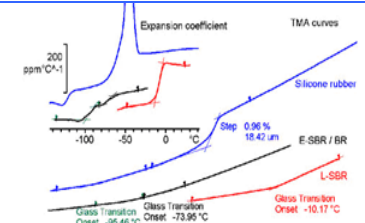


## THERMAL ANALYZER : TMA, DMA

### 열기계분석기 \_ TMA

#### TMA Application

- 크기(치수) 변화 (dimensional change) 측정
- Expansion and shrinkage behavior (팽창 및 수축 거동)
- Expansivity (Coefficient of linear expansion)
- Coefficient of Thermal Expansion (열팽창 계수, CTE)
- Young's shear modulus, stiffness
- Polymorphism (change of crystal modification)
- Glass transition (유리전이, T<sub>g</sub>)
- Softening (연화점)



### 동적기계분석기 \_ DMA

#### DMA Application

- Viscoelastic (점탄성) properties
- Shear modulus ( $G'$ ), - Young Modulus  $E'$
- Damping, Loss angle ( $\delta$ ), Loss factor (손실 계수,  $\tan \delta$ )
- Stress relaxation test
- Tension test(인장시험), - Bending test (굴곡시험)
- Compression test (압축하중 시험)
- Storage Modulus (저장탄성률,  $E'$ ,  $G'$ )
- Loss Modulus (손실탄성률,  $E''$ ,  $G''$ )
- Compliance ( $J'$ )
- Creep behavior, Creep test
- Curing kinetics, Curing time
- Degree of reticulation
- Fatigue test
- Gel time, - Relaxation time
- Glass transition temperature (유리전이온도, T<sub>g</sub>)
- Secondary transitions
- Impact resistance
- Linear/Non-linear behavior (선형/비선형적 거동)
- Prediction of long term mechanical behaviour
- Rheological properties





## We serve only thermal properties solutions.

Adhesion Testing System (ATS)

Thermal conductivity meter  
Thermal diffusivity meter  
Dilatometer

UTM: Material Testing System

Accelerating Rate Calorimeter, ARC  
Battery Calorimeter, EV-ARC  
Reaction Calorimeter

Thermal Analyzer: DSC, TGA, STA, TMA, DMA

Dielectric Analyzer

SThM Thermal Probes

Quartz Viscometer (Heated, Pressurized)  
High temperature Viscometer  
Plastometer

Thermal Analysis testing service

Thermal Analysis Workshop

Service

TGA/DSC/DTA Alumina pan, DSC Aluminum pan

### Find out more our high techniques

[www.yeonjin.com](http://www.yeonjin.com)

주식회사 연진코퍼레이션

(150-805) 서울특별시 영등포구 당산동 4가 32-141번지 연진빌딩 3층

Phone: 02-2675-0508 A/S: 02-2675-0566~7 Fax: 02-6918-6568 [support@yeonjin.com](mailto:support@yeonjin.com)

<http://www.yeonjin.com>