

磁光克尔效应测量系统

当一束线偏振光照被磁性介质反射后,反射光的偏振面相对于入射光的偏振面有一个小的角度偏转(克尔旋转角),这一现象被称为磁光克尔效应。后来这一效应被用来材料磁特性的研究。磁光克尔效应测量系统就是一套精确测量克尔旋转角的设备。磁光克尔效应测量系统是对极向克尔效应和纵向克尔效应克尔偏转角精确测量的设备,使得该设备成为研究磁性薄膜磁特性的最理想的测量工具。广泛的应用于磁性纳米技术、磁性薄膜等磁学领域。

磁光克尔效应测量系统以激光作为光源,由于样品磁光克尔效应的磁性信号主要来自于光斑照射的区域,因此磁光克尔效应测量系统具有良好的局域性,可以实现在微米区域内材料磁特性的研究。此外以偏振激光束作为“探针”,因此对样品不会造成任何损伤,实现对样品的无损测量,这对于需要做多次测量的样品是非常有利的。

磁光克尔效应测量系统具有极高的灵敏度,对克尔旋转角的探测精度可达到 ± 0.001 度。这一点使该设备在磁性薄膜磁特性的研究中具有重要的地位。利用铁芯电磁特产生外加磁场,可以提供高达 25kOe 的外加磁场。

上海昊量光电设备有限公司的磁光克尔测量系统主要可分为以下三类:

①极向测量磁光克尔测量设备

代表产品是 BH-810 系列。BH-810CPC25WF12 是其中的一款,主要是对 12 英寸的垂直磁记录介质磁特性的测量。可以精确的探测分析每个探测点的磁滞回线,该产品应用 408nm 的固体激光器,光斑直径为 1mm,外加磁场可高达 25kOe。

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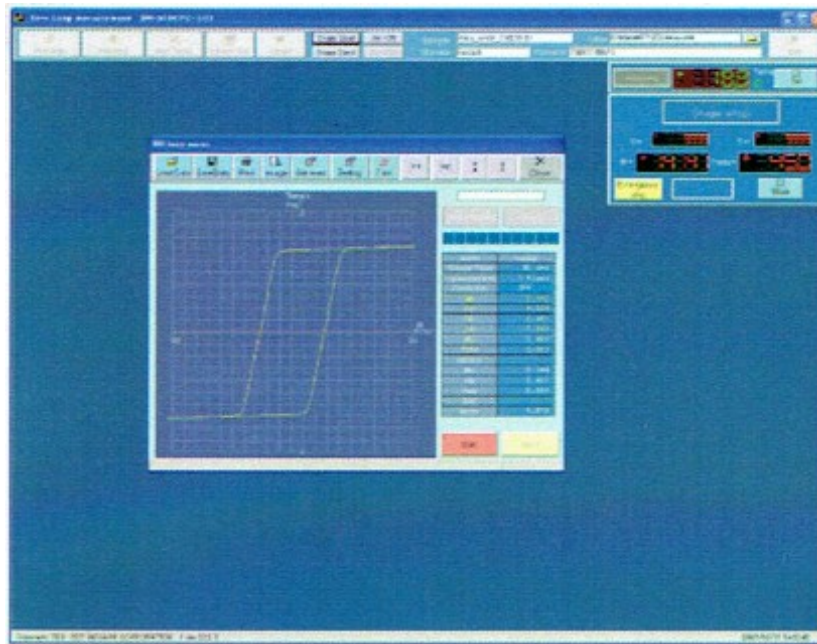
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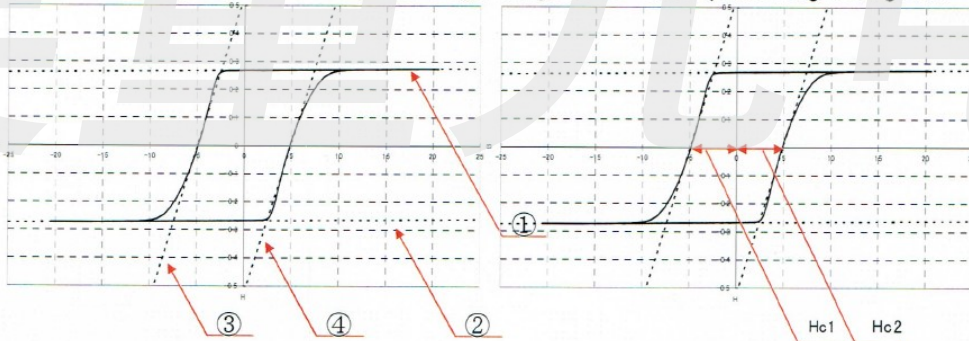
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測定解析例：The example of measurement analysis

4 approximate straight lines are used as below. Range for creation of ①, ② approximate lines is set-up by 「No. for calculation for MAX approximate line」 in environment set-up. Approximate calculation is made from max. of absolute value to the range of said set-up value. ③, ④ approximate straight lines are set up by 「No. of points neighboring Nz」. Nz is the crossing point of H=0 and B axis. Based on H=0 point, it is calculate approximate line in the range from +「No. of points neighboring Nz」 to -「No. of points neighboring Nz」.



②纵向测量磁光克尔测量设备

代表产品 BH-618 系列。BH-618SK-CA12 是一款自动测量晶圆磁特性和各向异性的磁光克尔测量系统。可以对 12 寸的晶圆进行多达 400 个不同点的磁滞回线的测量，并且探测结果以成像的形式显示。

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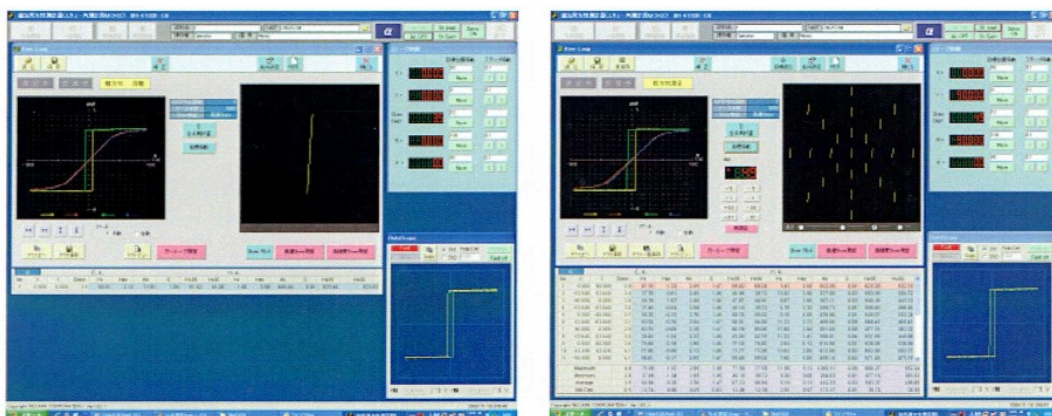
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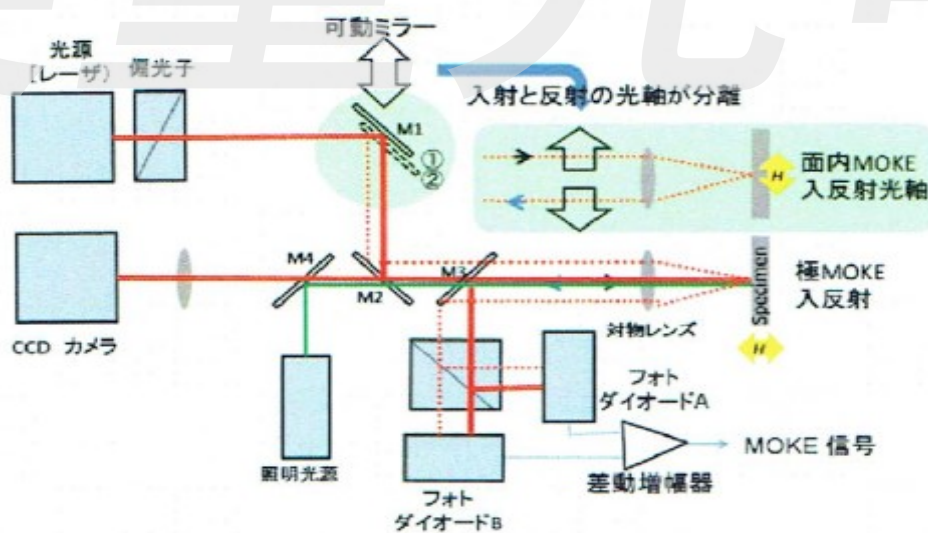
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③微区域磁光克尔效应测量系统 (μ -kerr system) (极向+纵向)

代表产品为 BH-920 系列。与前两款产品相比，BH-920 系列拥有更小的激光光斑，可以对微米区域内的磁特性进行研究。BH-P920-NH 是可进行极向的微区域磁光克尔效应测量系统，该设备具有极高的灵敏度可达到 0.001° 。与 BH-P920-NH 相比 BH-PI920 不但具相同的探测灵敏度并且兼具进行极向和纵向测量。



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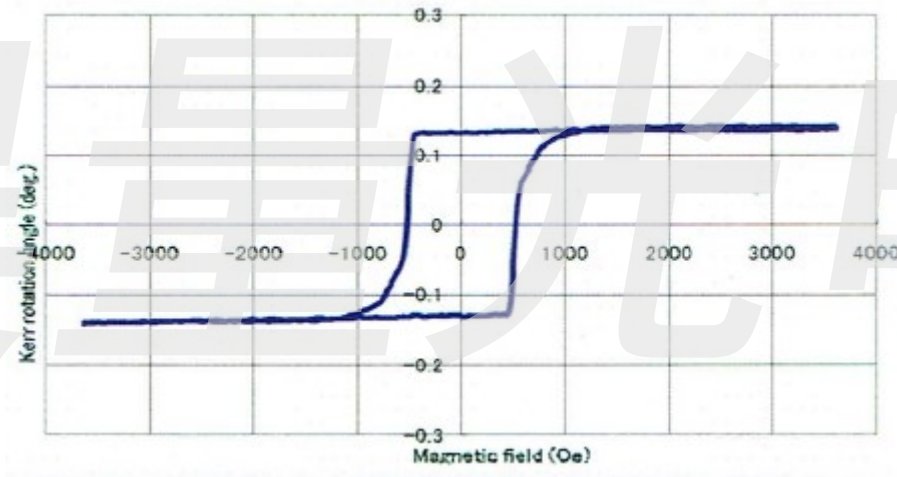
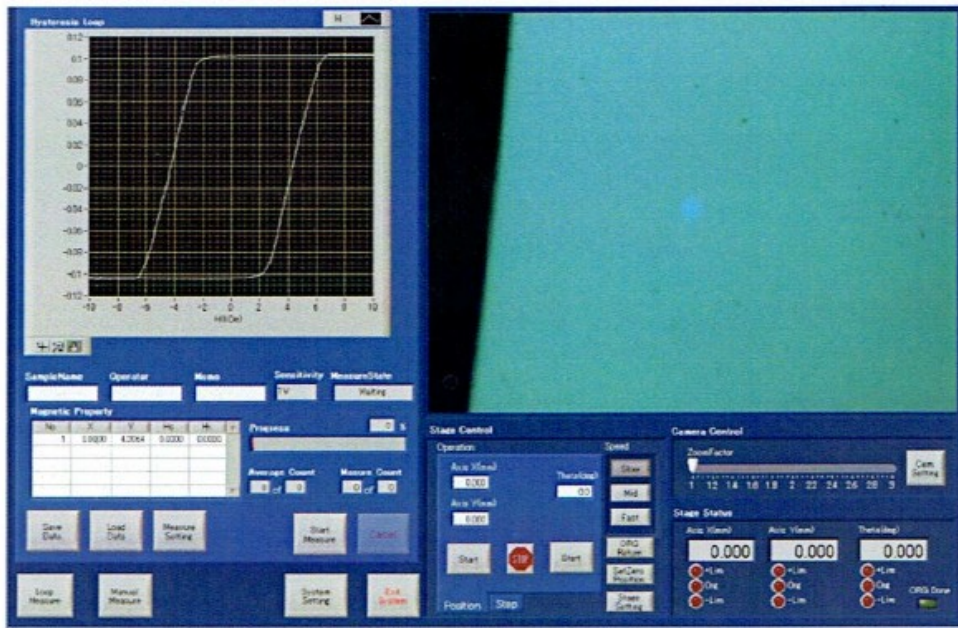
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◆主要特点

- 高性能
- 成本低
- 高灵敏度 (0.001°)
- 高稳定性
- 高外加磁场 (25KOe)

◆主要应用

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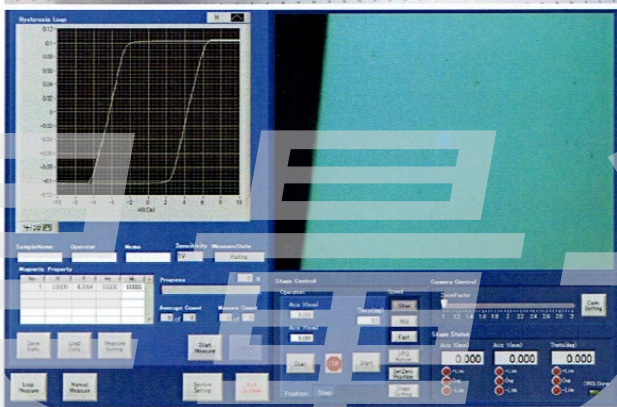
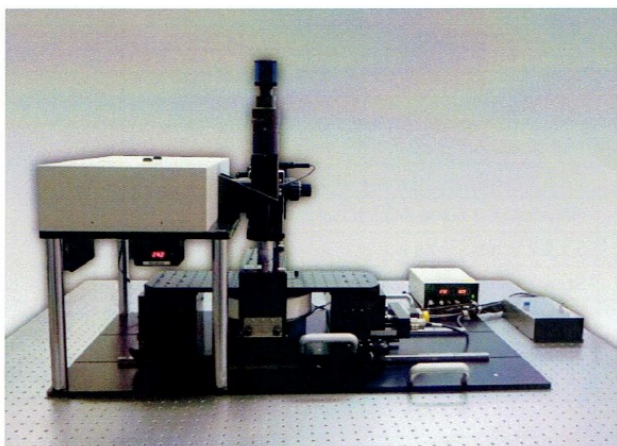
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磁性纳米技术、磁性薄膜等磁学领域

◆主要参数



*The appearance of the product may change without prior notice.

Feature

μ-MOKE System is a measurement equipment of polarization state change (Kerr Rotation Angle Change) based on Longitudinal Kerr Effect (Effect caused by In-Plane Magnetization) and Polar Kerr Effect (Effect caused by Perpendicular Magnetization) by irradiating focused laser beam to magnetic materials, mainly magnetic thin films.

By applying Magnetic Field with equipped Polar/In-Plane Electromagnet during measurement of polarization state change, magnetic property of local region of Magnetic material is able to be analyzed in the order of μm .

Target Sample

- Magnetic Thin Films
- Magnetic Patterned Devices

*A surface of each sample is necessary to be in reflective state for measurement.

Main Performance

- 1) **Light Source**
Diode Laser (405 nm Typ.)
- 2) **Spot Diameter**
Longitudinal Measurement: Approx. $5 \mu\text{m}$ [$1/e^2$]
Polar Measurement: Approx. $2 \mu\text{m}$ [$1/e^2$]
- 3) **Detection Sensitivity**
 ± 0.005 Degree
- 4) **Detection Range**
 ± 1 Degree
- 5) **Magnetic Field**
Polar Electromagnet: $> \pm 10$ kOe
In-Plane Electromagnet is also available.

Measuring Item

Hysteresis Loop

X Axis: Applied Magnetic Field H
Y Axis: Kerr Signal θ_k

Key Values obtained from Hysteresis Loop

- Coercive Force Hc
- Anisotropy Field Value Hk
- Magnetization Reversal Field Value Hn
- Saturated Magnetic Field Value Hs
- Residual Magnetization Value θ_r
- Saturated Magnetization Value θ_s

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μ-MOKE SYSTEM (MODEL: BH-PI920 Series)		
Reference Specification Sheet		
Measurement Part		
Light Source	Diode Laser (@ 405 nm Typ.)	
Spot Diameter	Longitudinal Measurement	Approx. 5 μm [1/e ²]
	Polar Measurement	Approx. 2 μm [1/e ²]
Detection Method	PBS Differential Method	
Detection Signal	Polarization state change (Kerr Rotation Angel Change) based on Longitudinal/Polar Kerr Effect. *Measuring Kerr Effects can be selected manually.	
Detection Sensitivity	±0.005 Degree (Equivalent) *Depends on sample state	
Detection Range	±1 Degree (Equivalent)	
Sample Observation Camera	0.3 Mega Pixel Color CCD (Lighting Source: Green LED)	
Electromagnet Part		
Polar Electromagnet	Generating Magnetic Field	> ± 10 kOe
Sample Holder for Polar Electromagnet	Acceptable Sample Size	5 x 5 x 1t mm ~ 10 x 10 x 1t mm
	Sample Stage	Motorized X Y Stage (Motion Range: > ± 20 mm)
Sample Holder for Polar Electromagnet	Acceptable Sample Size	5 x 5 x 1t mm ~ 10 x 10 x 1t mm
	Sample Stage	Same as one for Polar Electromagnet
Electromagnet Power Supply	Output Current	± 15 A
	Output Voltage	± 45 V
PC, OS, Monitor		
PC	IBM PC/AT Compatible PC	
OS	Windows 7	
Monitor	17 Inch Monitor	
Accessories	Keyboard, Mouse, Cables, Others	
Software		
Kerr Effect Measurement Software	Magnetic Field Control, Measurement Value Averaging, Hysteresis Loop Making (X Axis: Applied Magnetic Field, Y Axis: Kerr Signal θ _k), Various Parameter Calculation, Data Output and Storage	
Dimension and Weight		
Main Unit	Dimension	1000(W) x 900(D) x 1450(H) mm *Protruding parts are not included
	Weight	Approx. 350 kg
Rack (For PC and Others)	Dimension	570(W) x 700(D) x 1250(H)mm *Protruding parts are not included
	Weight	Approx. 100 kg
Utility and Operating Environment		
Power Source	Single-Phase AC100 V, 20 A (Two Lines, 50 / 60 Hz) *Acceptable Voltage Fluctuation Range: Within ± 3 %	
Air Pressure for Vibration Isolation Table	0.3 kgf/cm ² (Air Hose Diameter: Inner 4 mm / Outer 6 mm) *Air Compressor is not included to the product.	
Temperature Range	20 °C ~ 25 °C	
Humidity Range	30 %~60 % * No condensation is required.	
Laser Safety Standard	Class 3R (JIS C 6802) *This product is equipped with Laser Light Source. Please follow necessary safety guideline By the time of operation.	
Precaution	This product is a sensitive optical equipment. Please avoid shocks or/and vibrations to the product. The product is susceptible to harsh environment, especially weak to dusts or other fine particles. Please be noted to install and operate the product in environment with stable Temperature and Humidity.	

*This document is subject to changes at any time without notice.
*Actual Shape, Size and Color of the product may change during manufacturing period.
*Contents in this catalog is for a reference. Actual specifications will be decided in consultation.

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