

► **TECHNICAL JOURNAL 82E January, 2019**

1. Development of a Dry Etcher-Equipped Wet Rinse Unit for Metal Process
2. Development of a Cu Alloy Sputtering Target
3. Research on In-plane Thermoelectric Elements Using the Spin Seebeck Effect
4. Development of Niobium Nitride Thin Film for Next-Generation Superconducting Acceleration Cavities
5. "LS Series" Dry Vacuum Pumps with High Pumping Speed and Low Power Consumption

► **TECHNICAL JOURNAL 81E August, 2017**

1. Development of Sputtering system "SMD3400" For G10.5 mother glass
2. Development of High Resistivity Transparent Conductive Oxide Electrode using Sputtering Process
3. The printed circuit manufacturing using the nano metal ink and fabrication of transparent fine electrodes by gravure offset printing
4. Crystal growth of quantum dot phosphors and their application to photoelectric conversion device
5. Development of a quartz crystal resonator with a resonance frequency of 4MHz
6. Advanced Spectra Interpretation in TOF-SIMS "Parallel Imaging MS/MS"

► **TECHNICAL JOURNAL 80E April, 2017**

1. High-density Panel Level Package Solution
2. Recent Developments in MRAM Mass-Production Technology in ULVAC
3. Development of Niobium Superconducting Cavity
4. Hot Cathode Ionization Gauge "G-TRAN series ST2" Obtained High Stability and Long Life
5. Introduction Of Liquid Nitrogen Generator "EMP Series" and New Product "UMP-40W"
6. New application fields developed by Hard X-ray Photoelectron Spectroscopy: "PHI Quantes"

► **TECHNICAL JOURNAL No.79E October, 2015**

1. Deposition Technique of IGZO Film for Large Sputtering Cathode
2. Recent Development in Ion Implantation System for Crystalline Silicon Solar Cells
3. Development of the "CEE-950" Thin Film Encapsulation Equipment for OLEDs
4. Development of Leak Detector "HELIOT 900 Series"
5. Oil-sealed rotary vacuum pumps using magnetic couplings
6. Joint Development of Cryogen Free Dilution Refrigerator using 4K-Cryocooler

► **TECHNICAL JOURNAL No.78E October, 2014**

1. Development trend of nano-carbon materials for next-generation semiconductors

2.	Development of mass-production tool and process for high density PCRAM
3.	Development of Mass Production Technologies for SiC Power Devices at ULVAC
4.	Development of Cryopump CRYO-U48NF for Plasma Experiment
5.	Development of New UR4K Series of 4K-GM Cryocoolers

► **TECHNICAL JOURNAL No.77E October, 2013**

1.	Sputtering System SMV-500F for Manufacturing Printed Substrates
2.	Development of Precious-Metal(Au)-Free Solder Mounting Process for Si Device
3.	Development of Sputtering Technology for ReRAM Mass-Production
4.	Development of the EVQC-7000 Series Quick Charging Station
5.	PHI-X-tool:A Fully Automated XPS Microprobe
6.	Assessment of Platinum/Carbon Catalyst for Fuel Cell Created By Fabricated Using a Nanoparticle Formation Pulse Arc Plasma Source

► **TECHNICAL JOURNAL No.76E April, 2012**

1.	Application of InGaZnO TFT Deposition Technology to OLED Panels
2.	Development of “G-Tran Series” Multi Ionization Gauge, “SH2”
3.	Development of Large Pendulum Valves “VFR Series”
4.	Development of An Automated High-Speed Spectroscopic Ellipsometer “UNECS-3000A”
5.	User-friendly Surface Defect Detection System “MSC9000” for Steel Process Lines
6.	Xenon Flash Thermal Diffusivity Measurement System “TD-1 series”

► **TECHNICAL JOURNAL No.75E November, 2011**

1.	Automotive Polycarbonate Glazing and Exatec 900 System
2.	Latest Roll-to-Roll Technology for High-functionality Films
3.	High-precision Inkjet Printing System “S-200”
4.	The ENTRON™-EX2 W300 PVD/CVD Integration System
5.	TSV Turnkey Solution
6.	ULVAC’s Quick Chargers for Electric Vehicles (EVs)
7.	Optical Thin Color Insert Film
8.	The New “Drive MuLti” Motor Drive Unit Outer Control Loop-embedded AC Vector Inverter
9.	Application of Argon Gas Cluster Ion Beams to TOF-SIMS Depth Profiling

► **TECHNICAL JOURNAL No.74E April, 2011**

1.	Research and Development of Next-generation Secondary Batteries
2.	Formation of Textures on Crystal Si Substrates by Dry Etching
3.	A Compact, High-speed Spectroscopic Ellipsometer

4.	Development of the UNECS-2000 A Compact, High-speed Spectroscopic Ellipsometer
5.	Registration of a Japan Calibration Service System (JCSS) Laboratory for the Vacuum Range of 1 to 10 <sup>-3</sup> Pa
6.	Helium Leak Tester "ALT/S" High-accuracy, High-speed, Energy-saving, and Environmentally friendly
7.	Fine-spray Freeze Drying Equipment for Powder Production (Micro Powder Dry: μ PD) – Establishment of a Fully-closed System for Freeze-dry Formulation, covering from Chemical Preparation to Filling -
8.	Plasma Ashing System "Luminous NA-8000"
9.	Aqua Passing Rate Measurement System "AQ PassR"

▶ TECHNICAL JOURNAL No.73E November, 2010

1.	Mass Production Technology for Thin-film Lithium Secondary Batteries
2.	Production System for Double Junction Thin-film Silicon Solar Cells
3.	InGaZnO TFT Deposition Technology for Large Substrates
4.	Development of Nano-particle Ink for the Deposition of ITO Transparent Conductive Films
5.	Low-k Interlayer Dielectric Film Material "ULKS Ver. 3"
6.	Development of the Equipment Diagnostic System "FABISEQ™"
7.	Development of a 4-K Cryogenic Cooler
8.	[New Product] Resonance Shear Measurement System "RSM-1"

▶ TECHNICAL JOURNAL No.72E April, 2010

1.	The PHI 700 Xi™ Scanning Auger Nanoprobe
2.	Surface Analysis using the PHI 5000 VersaProbe™ Scanning X-ray Photoelectron Spectrometer
3.	Surface Analysis using PHI TRIFT V nanoTOF™, a Time-of-Flight Secondary Ion Mass Spectrometer
4.	Development of AFFINIX QN and QN μBio-Sensors
5.	Post-Vacuum, From Aerospace to Foods and Packaging – High-lubricity Metal Surface Treatment TUFAM®, NEDOX®, and NIFGRIP®
6.	Development of New Thermal Spray Materials for Shield Plates
7.	Tandem Type Thin-film Silicon Photovoltaic Module Production Turnkey Line

▶ TECHNICAL JOURNAL No.71E October, 2009

1.	XPS Analysis Technology for Organic Materials Using a Gas Cluster Ion Beam (GCIB) for Surface Analysis
2.	The Rapid Multi-Property Measurement System「RMP-1」
3.	Recent Developments in Vacuum Brazing Furnace Technology
4.	Development of Residual Gas Analysis/Process Gas Monitor 「Qulee HGM」
5.	Dry Etching Systems for LED Mass Production

6. Cu Wiring Process for TFTs – Improved Hydrogen Plasma Resistance with a New Cu Alloy –

7. Thin-film Photovoltaic Modules Production Turnkey Line

► **TECHNICAL JOURNAL No.70E June, 2009**

1. Development of Dye-sensitized Solar Cells

2. Development of Low-resistivity TiN Films using Cat Radical Sources

3. Orientation Control Technology Using PVD for Al/TiN/Ti Layers in Al Interconnect Fabrication

4. Development of Ashing Processes for Packaging Processes

5. [New Product]

High Productivity Resist/Residue Removal System “ENVIRO™-Xceed400”

6. Development of a New Type of Centrifugal Vacuum Distillation System

7. Large-sized Granite XY Stage

► **TECHNICAL JOURNAL No.69E December, 2008**

1. Development of Plasma Tube Arrays for Extra-large Screen, Thin, Lightweight,  
Low Power Consumption Film Displays

2. Cu Wiring Process for TFTs

– Enhancement of Adhesion and Barrier Characteristics Achieved with an Oxygen-Mixed Sputtering –

3. New In-line Sputtering System for 8.5 to 10th Generation CF Substrates「SDP-2600VTX/3000VTX」

4. Development of the Magrise Process: a System for the Mass Production of  
the World’s Highest-Grade Rare Earth Permanent Magnet

5. The Most Advanced Evaporation Roll Coater for Film Capacitors

6. EBH-800 Vacuum Evaporation System for Color Reflectors

7. Development of a Sputtering Systems for Non-conductive Metal Coating

“New Series of Sputtering Systems for Functional Decorative Coating”

8. Development of a Rocking Piston Type Dry Vacuum Pump for Suction Conveyance

9. [New Product]

Scanning Thermal Probe Micro-image System “STPM-1000”

► **TECHNICAL JOURNAL No.68E June, 2008**

1. OLED Display: Its Attractive Image Quality

2. ULVAC’s OLED Manufacturing System

3. Cleaning Processing of OLED Fabrication Equipment Parts

4. Sublimation Refining Instrument for OLED「TRS Series」

5. Development of Next-generation Fabrication Process of Magnetic Read Head for HDD Using Magest S200

6. Development of ITO Transparent Conductive Film Patterning Ink and Its Characteristics

7. [New Product]

► TECHNICAL JOURNAL No.67E January, 2008

1. Research and Development of Very High Capacity Nonvolatile Memory Using Transition Metal Oxide, and its Microstructure Fabrication Process
2. Development of Copper Interconnection Process and Equipment Aiming at Implementing 20-nm Interconnections
3. Development of Low-k Interlayer Dielectric for Interconnect Module Technology
4. Development of Carbon nanotube LSI Interconnections
5. Development of RIE Technology for Ferromagnetic Materials
6. Development of Low Power Consumption, High Frequency Devices Using Nitride Semiconductors
7. Development of Cat-CVD equipment
8. [New Product]  
New Ultra-High Vacuum Sputtering System「JSP-8000」

► TECHNICAL JOURNAL No.66E June, 2007

1. Single-substrate type Vertical Sputtering System [New SPV-1000N]
2. Formation of Ta-SiO<sub>2</sub> thin film resistor by using the digital sputtering method
3. Low-k Materials and Processing Technologies
4. Development of Deposition and Etching Technologies for Piezoelectric Elements for Ferroelectric MEMS
5. Method of Growth of SiGe Films without Use of High Temperature Process
6. Super ALPika - Corrosive-Resistant and Low Outgassing Surface Treatment of Aluminum Alloys for Vacuum Use
7. “STROM” Original Fishing Lure
8. [New Product]  
New Time-of-flight Secondary Ion Mass Spectrometer PHI TRIFT V nanoTOF
9. [New Product]  
PHI 5000 VersaProbe Multi-technique Scanning X-ray Photoelectron Spectroscopy Instrument

► TECHNICAL JOURNAL No.65E November, 2006

1. Formation of nano-thin films and nanoparticles by means of an arc plasma gun
2. Development of FEDs by means of a catalyst-containing cathode for GNFs
3. Latest technology incorporated in the “ZEM-3”  
—thermoelectric property evaluation equipment—
4. Ion Implantation System for Silicon Carbide
5. [New Product] Residual Gas Analyzer / Process Monitor [Qulee Series]
6. [New Product] New Model Chromatogram Acquisition Device [ChromatoDAQ II]

► TECHNICAL JOURNAL No.64E June, 2006

1.	Low-damage depth profile analysis using X-ray photoelectron spectroscopy with a C <sub>60</sub> ion gun
2.	The nano-LIX quadruplex-passed Michelson interferometric dilatometer
3.	Highly functional hard anodic oxide coating“complamite”
4.	Development of a deposition process for carbon nanotubes film
5.	Characteristics of ITO films deposited by a facing target sputtering method
6.	Sputtering system for large TFT substrates and its cathodes
7.	In-line sputtering system for manufacturing LCD-CF
8.	Plasma CVD system for manufacturing LTPS TFTs
9.	Green laser annealing system for manufacturing LTPS TFTs
10.	Liquid crystal drop filling (ODF)/vacuum bonding system: V-Series

► TECHNICAL JOURNAL No.63E January, 2006

1.	Rapid growth of high-density aligned carbon nanotube films using microwave plasma-enhanced CVD
2.	QCM Bio-Sensor
3.	The development of a quadrupole mass spectrometer —A compact quadrupole mass spectrometer with a digitally controlled RF power supply—
4.	The development of sensorless brushless DC canned motor for large dry pumps
5.	Development of a Linear Ion Source
6.	Numerical study of the characteristics of erosion in magnetron sputtering
7.	ULVAC MEMS Foundry Services

► TECHNICAL JOURNAL No.62E June, 2005

1.	Most advanced roll coating system for film condenser
2.	“Striation-free technology of ArF resists and the future progress of the NLD etching systems”
3.	Mass-production System and Process of FeRAM
4.	A Layer-by-Layer Cat-CVD with in-situ H <sub>2</sub> and NH <sub>3</sub> consecutive post-treatment for the formation of conformal and stoichiometric SiN thick films
5.	Development of growth control methods and deposition systems for carbon nanotubes
6.	Trial production of a 5-inch FED by using GNFs
7.	Development of anodic oxide coating for vacuum equipment“VACAL <sup>®</sup> ”and its adaptability to large parts
8.	Thermal Conductivity Measurement of Thermally Oxidized SiO <sub>2</sub> Films on a Silicon Wafer Using a Thermo-Reflectance Technique
9.	【New Product】

► TECHNICAL JOURNAL No.61E JANUARY, 2005

1. Minute Area Analysis by Scanning Auger Nanoprobe System PHI 700
2. Film Formations using Individually Dispersed Nano-Particle Inks and Pastes with existing Printing Technologies
3. Development of Film Pigments using Structural Coloring
4. The Production of Optical Films Using the Digital Sputtering Method
5. Development of large-sized CAT-CVD equipment
6. **【New Product】**  
RISE-300: 300 mm Wafer Batch-Type Native Oxide Film Remover

► TECHNICAL JOURNAL No.60E MARCH, 2004

1. Chemical State Analysis of Minute Area by Scanning X-ray Photoelectron Spectroscopic Analyzer PHI Quantera SXM
2. Applications and Perspectives for Organic Polymer Films
3. Integrated RF Power Supply Based on a New Concept
4. Quartz Crystal Unit Frequency Adjustment Using Ion Beam Etching

► TECHNICAL JOURNAL No.59E JANUARY, 2004

1. Development of a Small-size Gas Cluster Ion Source
2. Technique for Removing Oxide Layer on Silicon Substrate Surface Using an NLD Cleaning Mechanism
3. Development of chemical pre-treatment technology
4. ALD-WN Technology as Barrier Metal for Cu Interconnection
5. Orientation Control of High-Temperature Fill Al
6. Development of Al Wiring Technology Using Al-CVD Technology

► TECHNICAL JOURNAL No.58E JUNE, 2003

1. New SIS Technology for 70nm-generation device in Cu Interconnection
2. Introduction of Materials Control Department, Tsukuba Institute for Super Materials
3. MRAM ULVAC Solution
4. MRAM Deposition System and Process Development
5. Development of MgO Deposition Process
6. Development of Deposition Processes Using Evaporation and Sputtering, and Sampling Collaboration
7. METHODS FOR EVALUATING OUTGASSING CHARACTERISTICS OF MATERIALS AND SURFACE TREATMENTS

► TECHNICAL JOURNAL No.57E February, 2003

1. FORMATION OF A HAFNIUM NITRIDE FILM BY AN ARC PLASMA GUN

2. Introducing the Nanoscale Materials R&D Department
3. Development of a Visible-Light Response Titanium Oxide
4. NEDO Key Technology Research Promotion Program FED Nanophosphors and Nano-Thin-Film Phosphors
5. Studies of Hydrogen Storage in Nanocarbon Materials
6. GNF Growth Conditions and Field Emission Property
7. Prototyping and Evaluating GNF-FEDs
8. Development of a Flat-Panel Display High-Efficiency Light Retrieval Window Material

► **TECHNICAL JOURNAL No.56E September, 2002**

1. Development of Transparent Conductive Film for Organic LED (Super ITO)
2. Photocatalytic Film on Polycarbonate
3. Low-k materials etching in magnetic neutral loop discharge plasma
4. Application of magnetic neutral loop discharge plasma in deep silica etching
5. ADVANCED ANODIZING "VACALR<sup>®</sup>" FOR VACUUM EQUIPMENT

► **TECHNICAL JOURNAL No.55E March, 2002**

1. Energy-Saving Dry Vacuum Pumps
2. Development of Film Deposition Technology for Narrow Track-pitch-substrates
3. High Rate Deposition and Characterization of Diamondlike Carbon Films by Magnetron Plasma Chemical Vapor Deposition using a Roll Coater
4. Via Hole Formation in Polyimide Film by Plasma Etching using a Roll Etcher System
5. Development of an Etcher for Large Surface Area (~1 m<sup>2</sup>) Substrates
6. Visualization of Ambient Gas Temperature Distribution by Scatter-plate Interferometer
7. Surface Dynamics and Mesoscopies -PEEM/LEEM/XPEEM-

► **TECHNICAL JOURNAL No.54E September, 2001**

1. Development of New Low-k Material (ISM-1.5)
2. Size Measurement and Classification of Ultrafine Refractory Metal Particles Produced by Laser Irradiation
3. Analysis and Evaluation at the Tsukuba Institute for Super Materials
4. Optimization in Ultra Thin Film XPS Depth Profiling by Varying Take-off Angles, Ion Energies, Acceptance Angles, and Raster Ranges

► **TECHNICAL JOURNAL No.52-53E APRIL, 2001 - PART 1**

1. Glass Etching for MEMS
2. Manufacturing Qualification of an All-dry Via Deveil Plasma Process
3. Development of Cold Cathode Source Using Graphite Nanofibers



4.	High Quality GaN Film Grown by Polarity Control MBE
5.	Development of the Single Deposition Sputtering System for Phase-change Optical Disks
6.	Trends and Assessments of Thermal Desorption Spectroscopy
7.	New Method for Measuring the Thermal Diffusivity and Thermal Conductivity of Thin Films: Introducton to Fourier Transfomation Thermal Analysis
8.	Development of Extreme high Vacuum Gauge-AxTRAN

► **TECHNICAL JOURNAL No.52-53E APRIL, 2001 – PART 2**

9.	Quantitative Measurement of the Radiation Intensity in X-ray Photoelectron Spectroscopy
10.	Introduction to Particle Compositional Analysis Technology for Higher Yield
11.	Self-assembly Arrays of the Ultrafine Particle by a Q-switched YAG Laser Irradiation
12.	High Purity Metal Production Using Dry Refining Processes
13.	Developed Formerly but now on Attractive Surface Treatment-NIFGRIP <sup>(R)</sup>
14.	Rapid Cooling/Heating Super Trap
15.	Power Units for Film Manufacturing Processes
16.	Wavelength-shiftless Ion Plating Mechanism for the Optoelectronics Industry

► **TECHNICAL JOURNAL No.51 September, 2000**

1.	Development of a Cold Cathode Source Using Carbon Nanotubes
2.	Improvement of the Dry Etching Process for Chrome Photomasks
3.	Film Deposition Techanology Using Multi-Cathode Sputtering
4.	Development of Copper Wiring Technology by SOM Method
5.	Reducing Solvent Usage by Solubilizing Resist Ash Rdsidues
6.	Thermal Conductivity Measurement of a Thin Film Deposited on a Substrate by Modified AC-Calorimetry ---Laser-Heatin Angstrom Method
7.	Non-Contact Wafer Temperature Monitor NTM-500 and Application to a Sputter Module
8.	Preparation and Characterization of a Transparent Barrier AIOX Film by Activated Reactive
9.	Generation of Ultra-fine Tungsten Particles by Nd:YAG Laser Irradiation
10.	Rapid Room-Temperature Regeneration of Cryopumps