TÜBİTAK

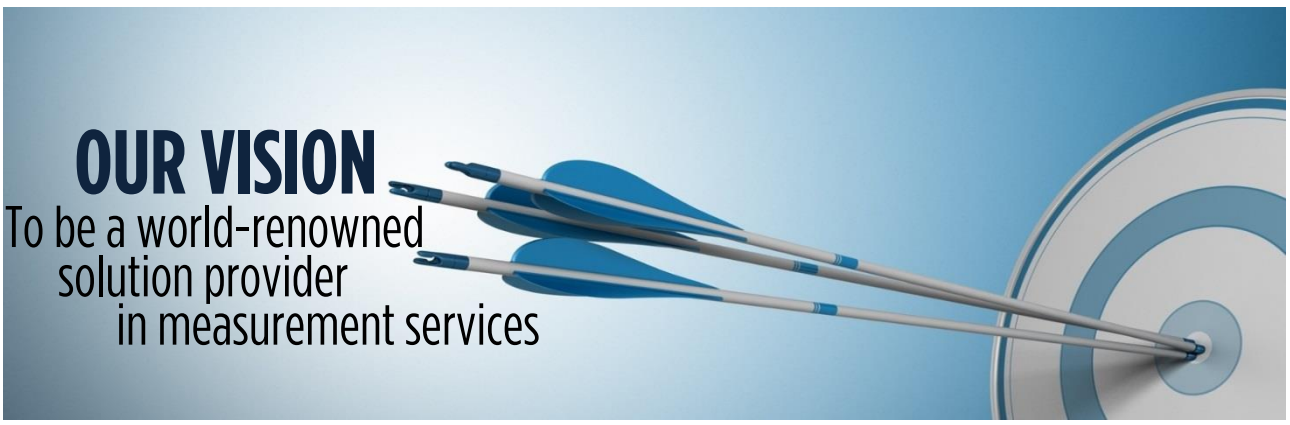
UME

ANNUAL REPORT 2017

TÜBİTAK NATIONAL METROLOGY INSTITUTE

2017
ANNUAL REPORT

CONTENTS



FOREWORD

Achieving change through measurements..

Dear Stakeholders,

We're pleased to present you our annual report in which you will find detailed information on the activities undertaken by the TÜBİTAK National Metrology Institute in 2017.

As in the past years, TÜBİTAK UME continued its activities aimed at the development and maintenance of national measurement standards and dissemination of measurement traceability. In addition to these core activities, TÜBİTAK UME continued its involvement in international R&D projects and efforts to develop solutions to challenges in industrial measurements.

TÜBİTAK UME carried out work on a total of 54 projects in 2017. Of these, 37 were co-funded by the European Union, 2 were funded by the Ministry of Development, 3 were TÜBİTAK funded and 12 were directly financed by customers (8 from within Turkey and 4 international).

Work began on 8 joint research projects within the European Metrology Programme for Innovation and Research (EMPIR) that were accepted for funding in the 2016 call cycle, while 10 EMRP (predecessor to EMPIR) projects were completed within the year.

Seven new Memorandums of Understanding were signed, one was renewed and related action plans were prepared as part of our effort to forge closer relations with other national metrology institutes in our geographical areas of interest; the Middle East, the Balkans, Central Asia and Africa. TÜBİTAK UME also successfully served stakeholders in 33 different countries with calibration, testing, training and consulting services, interlaboratory comparisons, turn-key establishment of laboratories and supply of reference instruments.

Two applications for national patents and two international patent applications based on the preemptive rights of our national patent applications were submitted for measurement systems designed by TÜBİTAK UME. These applications are now under evaluation.

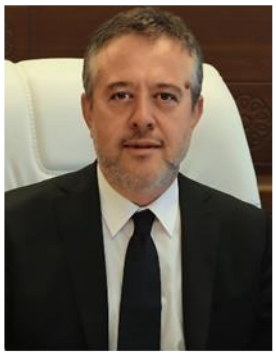
Our goal is to be counted among the most advanced metrology institutes in Europe, and the world, by the year 2023 as a result of our innovative scientific and technological activities.

To this end, TÜBİTAK UME has launched a new investment project supported by the Ministry of Development to establish a Quantum Metrology Laboratory and enhance the capabilities of existing laboratories that will allow us to take our place at the forefront of the developments shaping the future of metrology, such as the redefinition of the kilogram, ampere, mole and kelvin and the corresponding work of establishing and maintaining their primary realizations in the laboratory, while contributing to our country's international competitiveness and trade potential based on innovation and R&D in areas as diverse as defense systems, the environment, space technologies, energy, automotive industry, health, and food processing.

TÜBİTAK
UME

BOARD of DIRECTORS

Dr. Mustafa ÇETİNTAŞ
Director of Institute



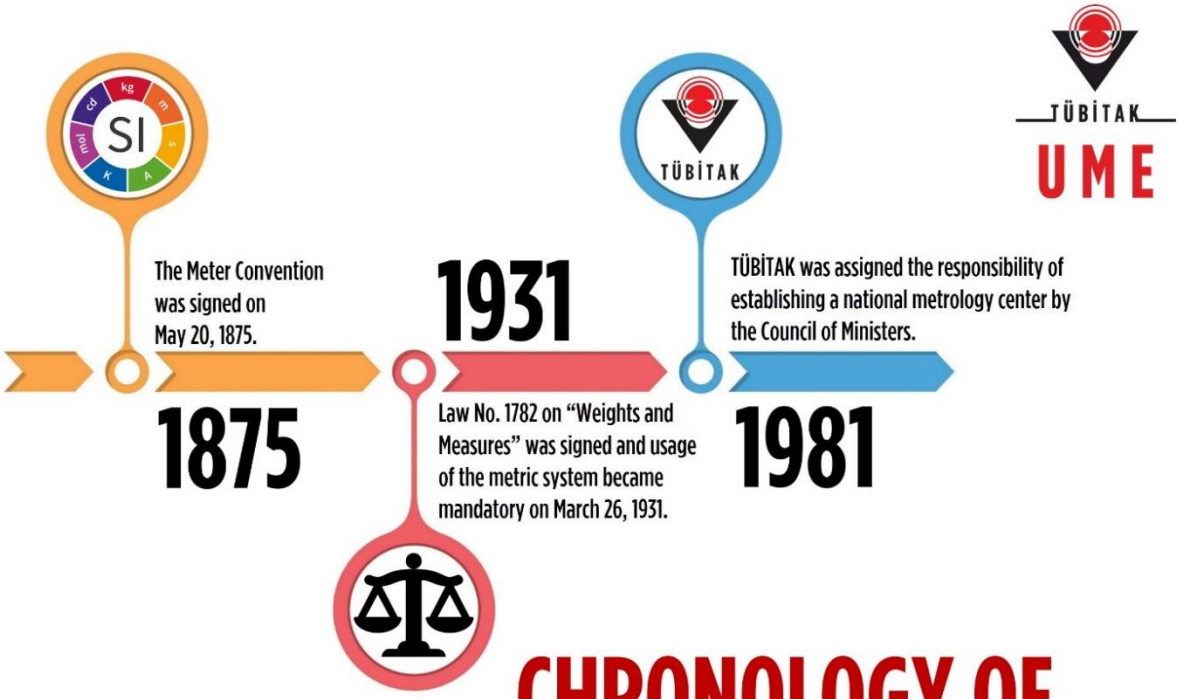
Dr. Mehmet KARABAY
Ministry of Family and Social Policies - Deputy Minister

Süleyman YAŞAR
TÜBİTAK
Secretary General

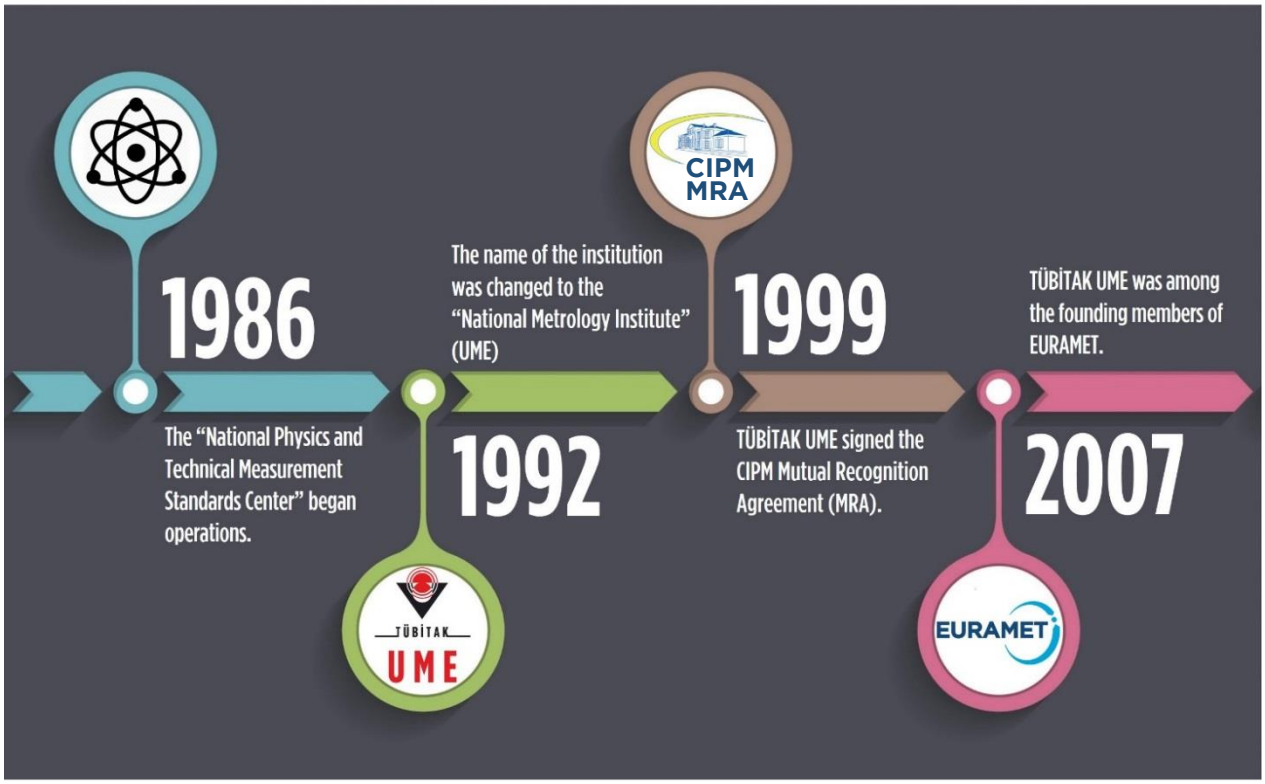
Önder BARAN
Ministry of Science, Industry and Technology - Head of Department

Dr.Akif AKGÜL
Machinery and Chemical Industry Institution - Vice President

Aydın ASLANDAĞ
Istanbul Chamber of Industry - Board of Directors' Member



CHRONOLOGY OF METROLOGY IN TURKEY



TÜBİTAK NATIONAL METROLOGY INSTITUTE

TRUE MEASUREMENT EXCELLENCE

R&D ACTIVITIES

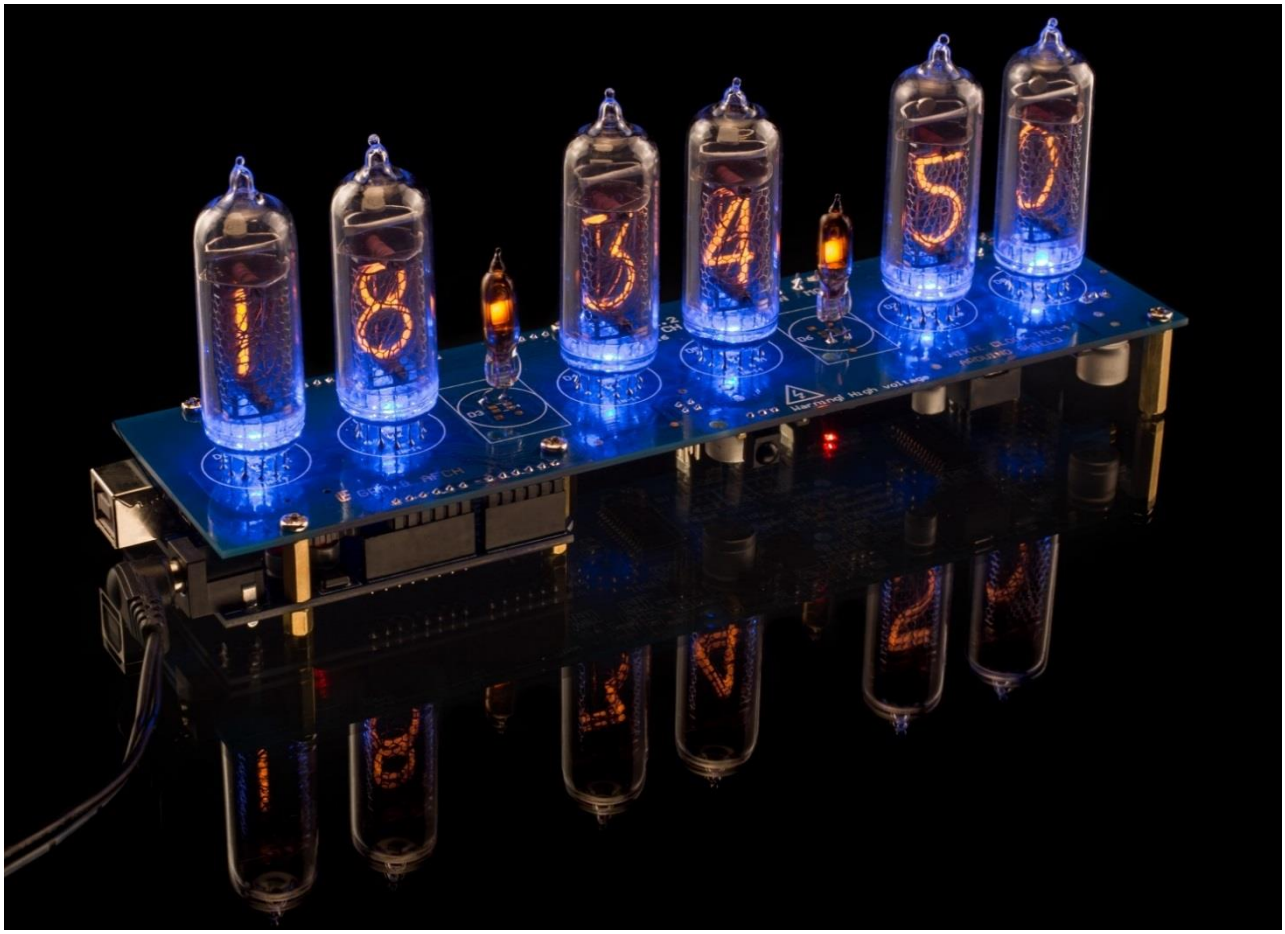
Activities related to the realization of primary level measurement standards remain the highest priority at TÜBİTAK UME in line with its institutional mission.

TÜBİTAK UME increased its participation in R&D projects with the aim of providing solutions to industrial measurement problems. TÜBİTAK UME carried out work on a total of 54 projects in 2017. Of these, 37 were co-funded by the European Union, 2 were funded by the Ministry of Development, 3 were TÜBİTAK funded and 12 were directly financed by customers (8 from within Turkey and 4 international).

Within EMPIR, TÜBİTAK UME initiated work in 8 projects that were funded in the 2016 call cycle, while work on 10 EMRP projects was concluded.

ONGOING INTERNALLY FUNDED PROJECTS

LABORATORY	PROJECT
Electromagnetics	Frequency Selective Electromagnetic Pollution Measurement
Medical Metrology	Establishment of Ear Temperature Reference System for Infrared Thermometers (IR)
Bioanalysis	HbA1c Referance Material Production
Dimensional	Establishment of Ellipsometry and Skaterometry Methods and Measurement Systems Infrastructure
Time/Frequency	Improvement of National Time Scale System
Time/Frequency	Photonically Based Rb Atomic Clocks and Rb Atomic Frequency Standard Generation
Impedance	Establishment of a Terminal Coaxial Digital Impedance Comparison System
Acoustics	Establishment of a Medical Metrology Research Laboratory
Time/Frequency	First Generation UME Watt Balance



COMPLETED INTERNALLY FUNDED PROJECTS

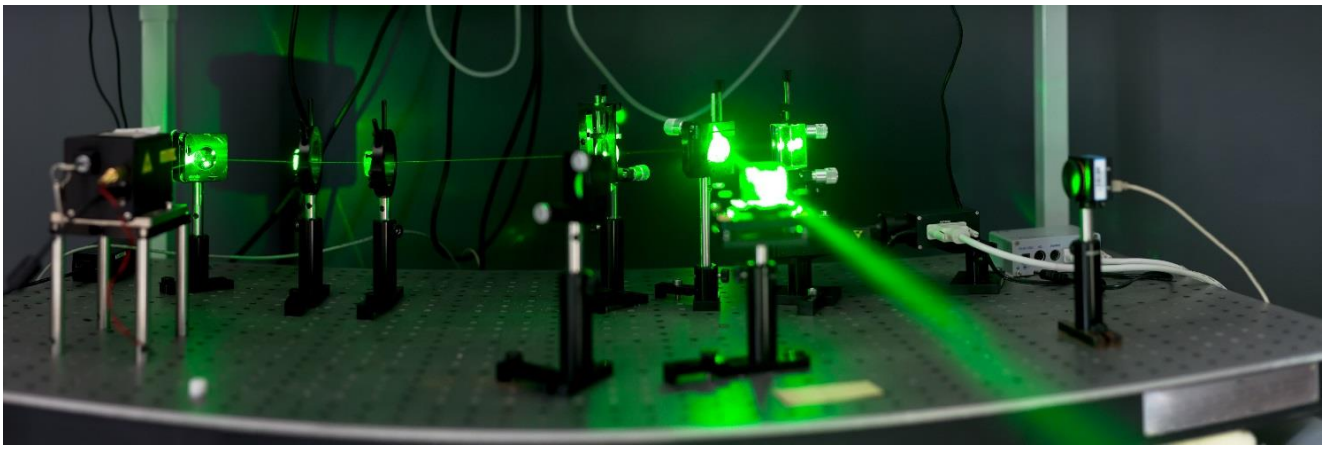
LABORATORY	PROJECT
Gas Metrology	Preparation and Certification of Primary Reference Gas Mixtures of Carbon Monoxide and Carbon Dioxide in Nıtrogen
Gas Metrology	Preparation and Certification of Primary Reference Gas Mixtures for Natural Gas Analysis
Bioanalysis	Production of Reference Material for Identification of Meat Species
Temperature	Production of Eutectic and Fixed-Points for Thermocouple Calibration
Optic	Establishment of a High Resolution Spectroradiometer System and Generation of Traceability Chain for Radiation
Electrochemistry	Establishment of Primary Level Electrolytic Conductivity Measurement System

ONGOING EXTERNALLY FUNDED INTERNATIONAL PROJECTS

LABORATORY	PROJECT
Organic Chemistry	Development and Production of Fuel Marker System and On-Site Marker Control Devices for OPET Company
Organic Chemistry	TP Turkish Petroleum Marker 2017 Project
Time/Frequency	Establishment of Traceable Time/Frequency Information Distribution Infrastructure
Magnetics	Magnetometer and Magnetic Torque Bar Development

COMPLETED EXTERNALLY FUNDED INTERNATIONAL PROJECTS

LABORATORY	PROJECT
Organic Chemistry	Production and Continous Update of National Marker System for Fuels (EMRA)
Organic Chemistry	ALPET Marker 2017 Project
Organic Chemistry	Production and Development of Diesel Performance Additive for TP (Turkish Petroleum)
All Laboratories	SASO/NMCC Establishment of Laboratories, Development and Consultancy Services Programme
Time/Frequency	SASO/NMCC Time and Frequency Laboratory Improvement Consultancy Services Programme
All Laboratories	SASO/NMCC Collaboration and Consulting for General Metrology
Power and Energy	Establishment of a Calibration Laboratory for TEİAŞ
Fluid Flow	Development of Pitot Tube Speed and Altitude Measurement System



ONGOING TÜBİTAK PROJECTS

LABORATORY	PROJECT
Time/Frequency	Development of High Power Laser System
Bioanalysis	Korea-Turkey Collaboration on Development of an International Standard System for Measurement of Gene Methylation

COMPLETED TÜBİTAK PROJECTS

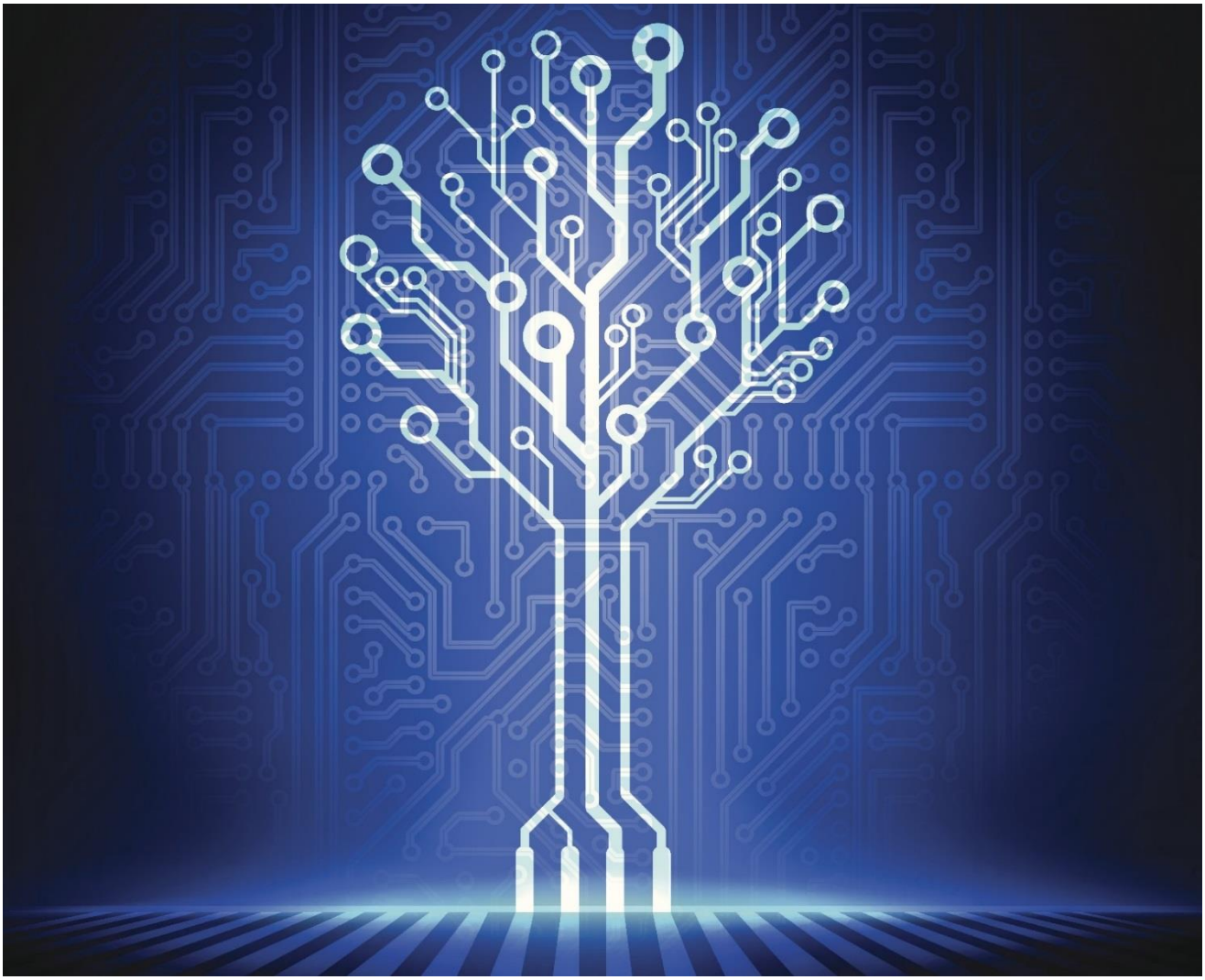
LABORATORY	PROJECT
Reference Materials	UME-Newborn Metabolic Diseases-SRM Project

ONGOING EMPIR PROJECTS

LABORATORY	PROJECT
Mass	Traceable Calibration of Dynamic Weighing Instruments
Reference Materials	Matrix Reference Materials for Environmental Analysis
Temperature	Developing Traceable Capabilities in Thermal Metrology
Voltage	Towards the Propagation of AC Quantum Voltage Standards
Pressure	Industrial Standards in the Intermediate Pressure-To-Vacuum Range
Acoustics	Metrology for Modern Hearing Assesment and Protecting Public Health from Emerging Noise
Impedance	Quantum Realisation of the SI Ampere
Time/Frequency	Optical Clocks with 1E-18 Uncertainty
High Voltage	Techniques for Ultra-High Voltage and Very Fast Transients
Bioanalysis	Novel Materials and Methods for the Detection, Traceable Monitoring and Evaluation of Antimicrobial Resistance
Dimensional	Freeform Lenses
Power and Energy	Traceability Routes for Electrical Power Quality Measurements
Temperature	Expansion of European Research Capabilities in Humidity Measurement
RF and Microwave	Development of RF and Microwave Metrology Capability
Temperature	Implementing the New Kelvin 2
Magnetics	Nano –Scale Traceable Magnetic Field Measurements
Time/Frequency	Optical Frequency Transfer – A European Network
Voltage	Waveform Metrology Based on Specctrally Pure Josephson Voltages
Inorganic Chemistry	Role of Metals and Metal Containing Biomolecules in Neurodegenerative Diseases such as Alzheimer's Disease
RF and Microwave	Measuring the SAR value using Vector Prob
Optic	Advanced FV Energy rating
Pressure	Developing Research Skills for Traceable Intraocular Pressure Measurements
Inorganic Chemistry	Development of Scientific and Technical Capabilities in Chemical Analysis
Inorganic Chemistry	Oxidized Mercury Metrology
Gas Metrology	Metrology for Nitrogen Dioxide
Gas Metrology	Metrology for Stable Isotope Reference Standards
Reference Material	Certified Alcohol Reference Material for Forensic Applications

COMPLETED EMRP PROJECTS

LABORATORY	PROJECT
Dimensional	EU-ASEAN S&T Cooperation to Jointly Tackle Societal Challenges (SEA-EU-NET 2)
Gas Metrology	Metrology for High-Impact Greenhouse Gases (HIGHGAS)
Gas Metrology	Metrology for Biogas (BIOGAS)
Power and Energy	Sensor Network Metrology for the Determination of Electrical Grid Characteristics (GridSens)
Power and Energy	Non-Conventional Voltage and Current Sensors for Future Power Grids (FutureGrids)
Optics	Metrology for Efficient and Safe Innovative Lighting (MESAiL)
Optics	Metrology for III-V Materials Based High Efficiency Multi-Junctions Solar Cells (SolCell)
Temperature	Metrology for Meteorology (MeteoMet2)
Organic Chemistry	Metrology for VOC Indicators for Air Pollution and Climate Change (KEY – VOCs)
Organic Chemistry	Traceability for Mercury Measurements (MeTra)



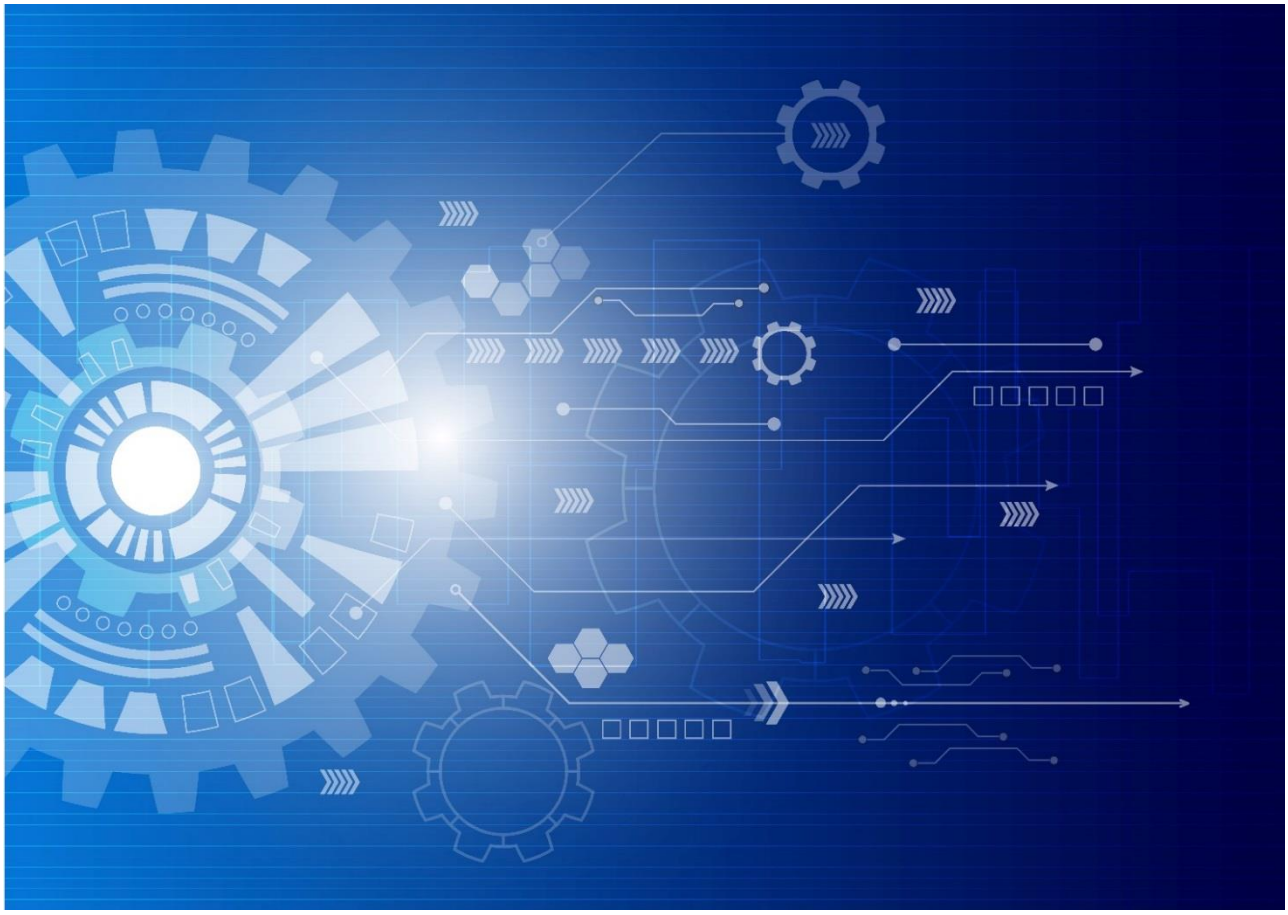
NATIONAL MEASUREMENT STANDARDS

TÜBİTAK UME continued to fulfill the demands of its local and foreign customers for calibration, training and consultancy services in 2017.

TÜBİTAK UME provided 638 types of test and calibration services with its established infrastructure of 126 different primary level standards that encompass 112 different measurement quantities in 2017.

TÜBİTAK UME developed 8 new measurement techniques and added 1 measurement quantity to its range of measurement capabilities.

TÜBİTAK UME produced 35 new references / devices / standards in 2017 for use as national measurement reference standards and/or standard measurement systems.



NEW MEASUREMENT QUANTITIES

LABORATORY	MEASUREMENT QUANTITY
Accoustics	Measurement the Impact Velocity of a Solid Particle in a Solid Plate Experiment

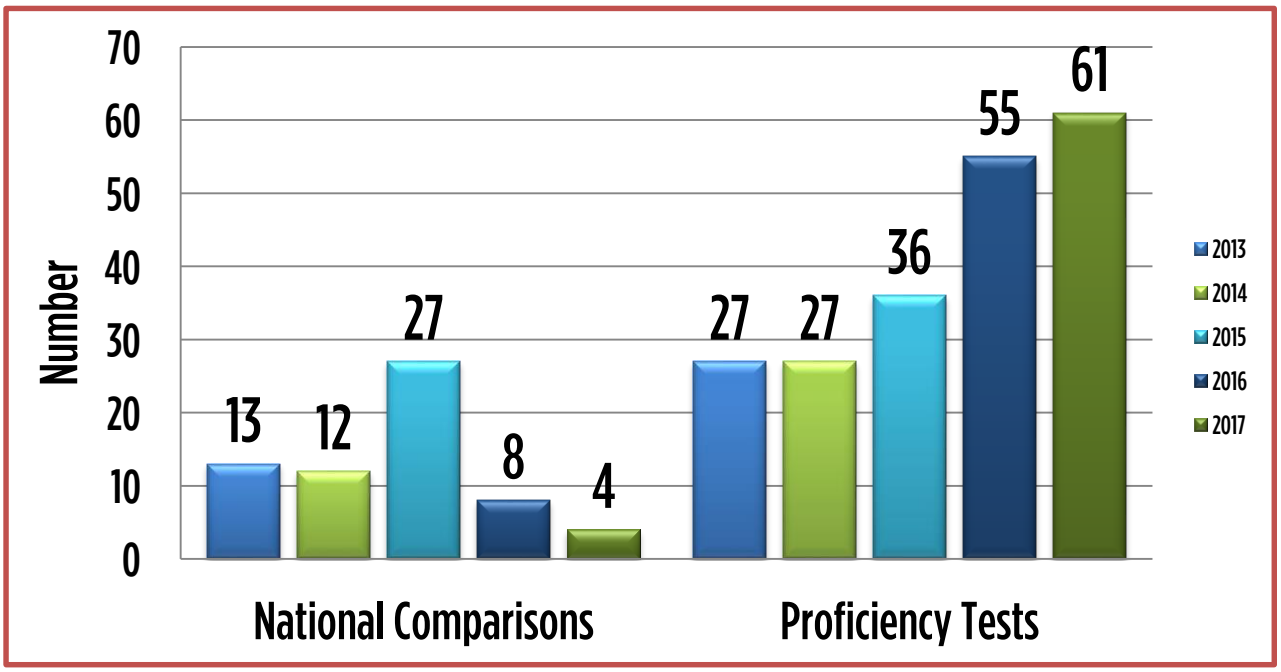
NEW MEASUREMENT TECHNIQUES

LABORATORY	MEASUREMENT TECHNIQUE
Accoustics	New Calibration Method for Velocity Calibration of a Solid Plasma Multiplication Experiment
Electromagnetics	Loop Antenna Calibration with the "Three Antenna Method" Using a Network Analyzer
Optics	Radiation and Radiation Sensitivity
Optics	Spectral Radiance Measurement
Organic Chemistry	Determination of Formaldehyde in Nitrogen
Organic Chemistry	LCMS Method for Enrofloxacin and Sulfadiazine in Cattle
Organic Chemistry	HRLCMS Method for Amino Acid Detection in Acidic Solution
Temperature	Ear Thermometer Calibration System Setup

REFERENCE DEVICES / MATERIALS PRODUCED

LABORATORY	REFERENCE DEVICE / MATERIAL
Impedance	Temperature Controlled Capacitor 1000 nF (2 units)
Impedance	Temperature Controlled Capacitor 100 nF (2 units)
Impedance	Temperature Controlled Capacitor 10 nF (2 units)
Impedance	1 Gohm Standard Resistance (3 units)
Impedance	1 Tohm Standard Resistance (3 units)
Gas Metrology	Nitrogen Oxygen Gas Mixture (0,21 and 0,01 mol/mol) (2 units)
Power and Energy	Voltage Measuring Unit (1 unit)
Power and Energy	Transformer Winding Ratio Calibrator (1 unit)
Power and Energy	240 V Resistive Voltage Splitter (1 unit)
Power and Energy	120 V Resistive Voltage Splitter (1 unit)
Power and Energy	60 V Resistive Voltage Splitter (1 unit)
Power and Energy	Openable Magnetic Protected Rogowski Bobin (1 unit)
Mass	Robotic Solid Density Measurement System for 2 kg-50 kg (1 unit)
Mass	Robotic Density Measurement System for Determining the Density of Mass Standards for 2 kg-50 kg (1 unit)
Medical Metrology	Visualization Phantom Prototype (1 unit)
Optic	Reflection Type Trap Dedector (2 units)
Temperature	Aluminum Fixed Point Cell (1 unit)
Temperature	Water Triple Point Cell (1 unit)
Temperature	Indium Fixed Point Cell (1 unit)
Temperature	Zinc Fixed Point Cell (1 unit)
Time/Frequency	Yb fs fiber comb (700 - 1400 nm) Optic Frequency Synthesizer (1 unit)
Reference Materials	Soil Ph Reference Material (10 units)
Reference Materials	Total Organic Material and Lime in Soil Reference Material (20 units)
Reference Materials	Sulfur Dioxide in Apricot Reference Material (15 units)
Reference Materials	Filtered Blossom Honey Reference Material (5 units)
Reference Materials	Colemanite Certified Reference Material (2000 units)
Reference Materials	Total Impurities in Diesel Reference Material (56 units)
Reference Materials	Wheat Flour Reference Material (20 units)

In 2017, 4 national comparisons and 61 proficiency tests were organized. While the national comparisons consisted of measurements conducted in the areas of Dimensional Measurements, Electromagnetics, Mass, and Temperature; the proficiency tests were organized by the Gas Metrology, Power and Reference Materials laboratories.



National Comparisons and Proficiency Tests Organized in the Last Five Years

NATIONAL COMPARISONS

LABORATORY	COMPARISON NAME
Dimensional	Screw Gauge Comparison
EMC	16-02 MIL-STD 461F (CE101, CE102, RE101) Comparison
Mass	National Comparison 500 kg M1
Temperature	Resistance Thermometer Comparison

PROFICIENCY TESTS

LABORATORY	PROFICIENCY TEST NAME
Gas Metrology	Determination of Natural Gas Components 1
Gas Metrology	Exhaust Emission Gas Analysis
Gas Metrology	Determination of Natural Gas Components 2
Gas Metrology	Determination of Nitrogen Monoxide in Nitrogen
Gas Metrology	Determination of Methane in Nitrogen
Gas Metrology	Determination of Sulfur Dioxide in Nitrogen
Gas Metrology	Determination of Carbon Monoxide in Nitrogen
Reference Materials	Salt Iodate Reagent Sufficiency Test
Reference Materials	KOI Reagent in Waste Water 1
Reference Materials	Acidity Testing of Sunflower Oil
Reference Materials	Ketchup Benzoate Sorbate Reagent 1
Reference Materials	Fracture Index in Sunflower Oil, Peroxide Number, Iodine Determination Proficiency Test
Reference Materials	Non-Alcoholic Beverages
Reference Materials	Honey
Reference Materials	Wheat Flour
Reference Materials	Tea
Reference Materials	Determination of Suspended Solid in Water
Reference Materials	Alcoholic Beverages
Reference Materials	Determination of Aflatoxin in Dried Figs
Reference Materials	Determination of Mineral Oils in Edible Oils
Reference Materials	Determination of Meat Species
Reference Materials	Determination of Milk pH
Reference Materials	Determination of pH in Water 1
Reference Materials	Determination of Fruit Juice pH Proficiency Test
Reference Materials	Coal
Reference Materials	Determination of Elements in Drinking Water
Reference Materials	Determination of Anions in Drinking Water

PROFICIENCY TESTS

LABORATORY	PROFICIENCY TEST NAME
Reference Materials	Bread
Reference Materials	Determination of Elements in Tomato Sauce
Reference Materials	Determination of Sulphur Dioxide in Dried Apricots
Reference Materials	Water Turbidity Alkalinity TOC Reaction
Reference Materials	Determination of Ph in Soil
Reference Materials	Determination of Electrical Conductivity in Water
Reference Materials	Determination of Cations in Water
Reference Materials	Determination of TOM and Lime in Soil
Reference Materials	Animal Feed
Reference Materials	Determination of Electrical Conductivity in Soil
Reference Materials	Determination of Elements in Waste Water
Reference Materials	Determination of HMF, Glucose, Fructose, Saccharose, Diastase Number, Free Acidity, Moisture and Water Insoluble Solid Matter in Honey
Reference Materials	Determination of Cation in Water
Reference Materials	Determination of Element in Waste Water 2
Reference Materials	Determination of Aflatoxin in Dried Figs 2
Reference Materials	Determination of Aflatoxin and Total Oil in Hazelnuts
Reference Materials	Determination of Colour in Water
Reference Materials	Determination of Benzoate and Sorbate in Ketchup 2
Reference Materials	Determination of Elements in Drinking Water 2
Reference Materials	Determination of Ph in Soil 2
Reference Materials	Determination of Moisture, Ash, Fat, Protein and Sedimentation Index in Wheat Flour
Reference Materials	Determination of Element in Soil
Reference Materials	Determination of Conductivity in Soil
Reference Materials	Determination of Aflatoxin in Dried Figs 3
Reference Materials	Determination of Anions in Drinking Water 2
Reference Materials	Determination of Suspended Solids in Water 2
Reference Materials	Determination of Ph in Water 2
Reference Materials	Determination of Total Organic Matter in Soil
Reference Materials	Determination of Conductivity in Water
Reference Materials	Determination of KOI in Waste Water
Reference Materials	Determination of pH in Waste Water
Reference Materials	Determination of EC in Waste Water
Reference Materials	Determination of d13C Isotope in Honey
Force	Tensile Strength in Metallic Materials

INTERNATIONAL ACTIVITIES

TÜBİTAK UME raised its international profile with new initiatives to increase its engagement with the BIPM and regional metrology organizations in 2017.

New Memorandums of Understanding were signed with metrology institutes in Russia, Poland, Bosnia Herzegovina, P.R. China, Uzbekistan and Benin, while the the MoU with NMIE of Ethiopia was renewed. An agreement was also reached with the Sudan Standards and Metrology Organization (SSMO) for the establishment of new Temperature and Medical Metrology laboratories.

An agreement was reached with the BIPM for TÜBİTAK UME to offer long terms research placements for metrologists from developing institutes as a contribution to the BIPM's Capacity Building and Knowledge Transfer Programme. Applications to the programme were accepted in the fall of 2017 and from these, ten metrologists from Belarus, UAE, Bosnia Herzegovina, Ethiophia, Ghana, Iran, Kazakhstan, Kenya, Saudi Arabia and Zambia were selected to perform research at TÜBİTAK UME laboratories for periods of one to three months in 2018. 8 joint research projects funded within the scope of European Metrology Programme for Inovation and Research (EMPIR) were started in 2017.

On the other hand, 10 EMRP projects were completed within this time period. With these steps, TÜBİTAK UME moved closer to its goal of becoming one of the leading national metrology institutes in Europe and the world by 2023, the centennial of the establishment of the Republic of Turkey.

TÜBİTAK UME participated in 19 international measurement comparisons in 2017.

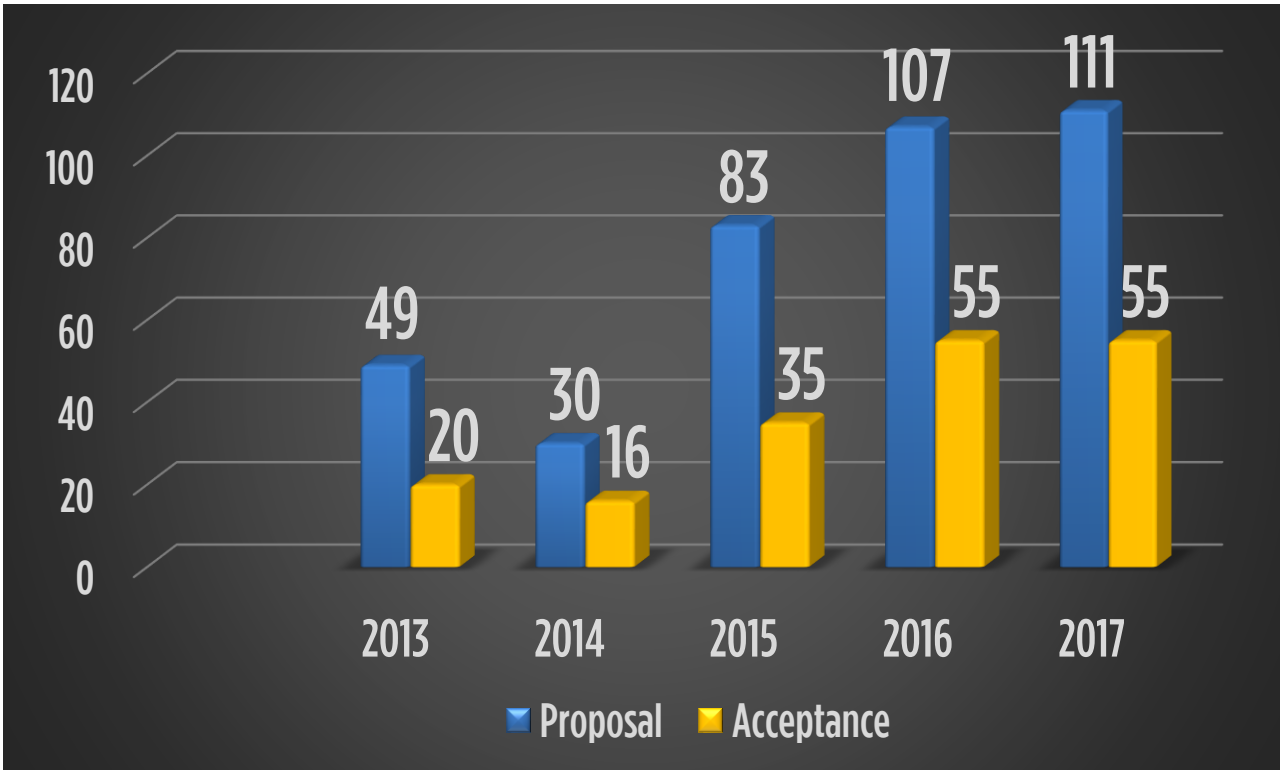
INTERNATIONAL COMPARISONS

LABORATORY	COMPARISON NAME
Acoustics	Determination of Pressure Sensitivity of Reference Standard Microphones (Bilateral with SASO NMCC)
Acoustics	Determination of Sensitivity and Phase Shift Values of Reference Standard Accelerometers (EURAMET)
Acoustics	Determination of Sensitivity and Phase Shift Values of Reference Standard Accelerometers (Bilateral with SASO NMCC)
Bionalysis	Relative Measurement of the Quantities of Genomic DNA Isolated from Biological Tissue
Dimensional	Comparison of Diameter Standards (EURAMET)
Dimensional	Short Gauge Block Calibration by Mechanical Comparison (GULFMET)
Dimensional	Comparison of Depth Standards (EURAMET)
Dimensional	Comparison of Step Gauge (EURAMET)
Electrochemistry	Pilot Comparison for pH Measurement in Phosphate Buffer (COOMET)
Electrochemistry	Key Comparison for pH Measurement in Carbonate Buffer (CCQM)
Electromagnetics	Comparison of Magnetic Field Measurements (Bilateral with SASO NMCC)
Electromagnetics	Comparison of Electrical Field Measurements (Bilateral with SASO NMCC)
Gas Metrology	Comparison of Natural Gas Analysis (Bilateral with SASO NMCC)
Gas Metrology	Comparison of Carbon Dioxide in Nitrogen (Bilateral with SASO NMCC)
Voltage	Binary Comparison of DC Voltage Standards (Bilateral with SASO NMCC SASO NMCC)
Voltage	Binary Comparison of AC-DC Current Shunt (Bilateral with SASO NMCC)
Temperature	Comparison of Pycnometer Calibration (Bilateral with SASO NMCC)
Electrochemistry	Comparison of Measurement Cylinder Calibration (Bilateral with SASO NMCC)
Bulk Density and Viscocity	Comparison of Liquid Viscosity Calibration (Bilateral with SASO NMCC)
Bulk Density and Viscocity	Comparison of Graded Pipette Calibration (Bilateral with SASO NMCC)
Bulk Density and Viscocity	Flask Calibration Comparison (Bilateral with SASO NMCC)
Bulk Density and Viscocity	Hydrometer Calibration Comparison (Bilateral with SASO NMCC)
Bulk Density and Viscocity	Comparison of Metal Volume Cap Calibration (Bilateral with SASO NMCC)
Bulk Density and Viscocity	Mikropipet Kalibrasyonu Karşılaştırması (Bilateral with SASO NMCC)
Pressure	0.7 MPa to 7 MPa Numerical Pressure Meter Comparison Measurement in Gas Medium (GULFMET)
Mass	Mass Standards Comparison (Bilateral with SASO NMCC)
Mass	Key Comparison of Lower and Upper Layer of Kilogram (COOMET)

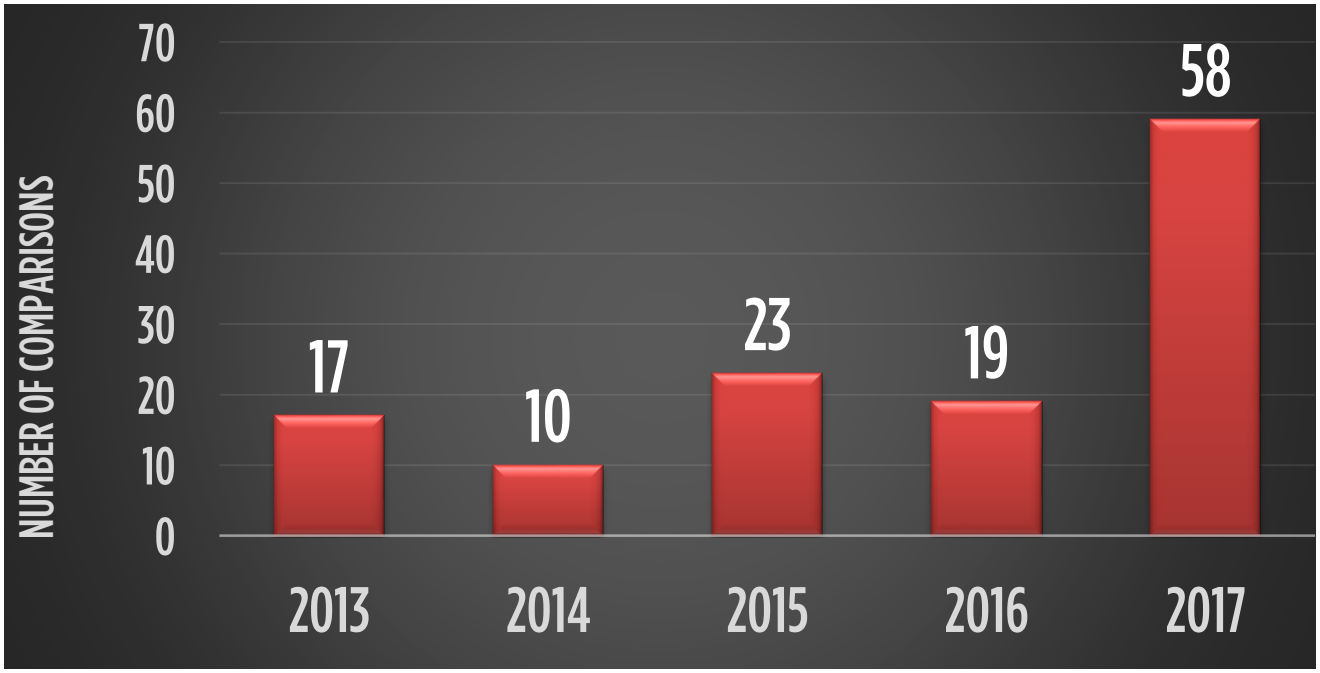
INTERNATIONAL COMPARISONS

LABORATORY	COMPARISON NAME
Inorganic Chemistry	Comparison of elements in River Water (EURAMET)
Inorganic Chemistry	Comparison of Cu Calibration Solutions prepared by NMI/DI (CCQM)
Inorganic Chemistry	Comparison of Elements in Human Serum (CCQM)
Inorganic Chemistry	Comparison of Heavy Metals and Organo-Tin Compounds in Leather Powder (CCQM)
Force	Binary Comparison on Hardness Reference Blocks (Bilateral with SASO NMCC)
Force	Binary Comparison Between 1000 N · m Torque Standard Machines (Bilateral with SASO NMCC)
Force	Binary Comparison Between 50 N · m Torque Standard Machines (Bilateral with SASO NMCC)
Force	Hardness Tip Calibration Systems Comparison (Bilateral with SASO NMCC)
Force	Rockwell, Brinell and Vickers Test Scale Binary Comparison (Bilateral with INRIM)
Force	Force Standard Machines Comparison (GULFMET)
Force	Force Standard Machines Binary Comparison (GULFMET)
Force	Force Standard Machines Binary Comparison (Bilateral with SASO NMCC)
Force	Force Switch Comparison (EURAMET)
Medical Metrology	Ultrasonic Power Comparison Measurements (Bilateral with CSIC)
Optic	Regular Spectral Permeability Comparison at 380 nm to 1000 nm (EURAMET)
Optic	Permeability, Color (Y, x, y and L * a * b *) Measurements Comparison (COOMET)
Optic	Comparison of Spectral Sensitivity Measurements at 300 nm to 1000 nm (CCPR)
Organic Chemistry	Pilot Study for QNMR Data Collection and Processing (CCQM)
Organic Chemistry	Determination of Amino Acids in Acetic Acid Solution (CCQM)
Organic Chemistry	Comparison of Enrofloxin and Sulphadiazine Receptor in Cattle (CCQM)
Temperature	Relative Humidity Comparison (GULFMET)
Temperature	Dichotomous Temperature Binary Comparison Between -80 ° C and +10 ° C (EURAMET)
Temperature	Comparison of the International Temperature Scale at the Silver Freezing Point Temperature (961.78 ° C) (Bilateral with SASO NMCC)
Temperature	Radiation Temperature Comparison (GULFMET)
Vacuum	Comparison of Absolute Pressure between 0,0003 Pa and 1 Pa with Transfer Standard SRG (EURAMET)
Vacuum	Key Comparison of Absolute Gross between 0,3 mPa and 0,9 Pa (COOMET)
Vacuum	Comparison of Absolute Pressure Between 0.03 Pa and 13 Pa (COOMET)
High Voltage	Comparison of Reference Lightning Impact Measurement System (EURAMET)
Time/Frequency	Binary Comparison on Measurement of Measuring Blocks by Interferometry (Bilateral with SASO NMCC)
Time/Frequency	Reference Time Scale UTC-UTC (UME) Comparison (CCTF)
Time/Frequency	Comparison of the Wavelength Standard (Iodine Stabilize He-Ne Laser at 633 nm) (CCL)

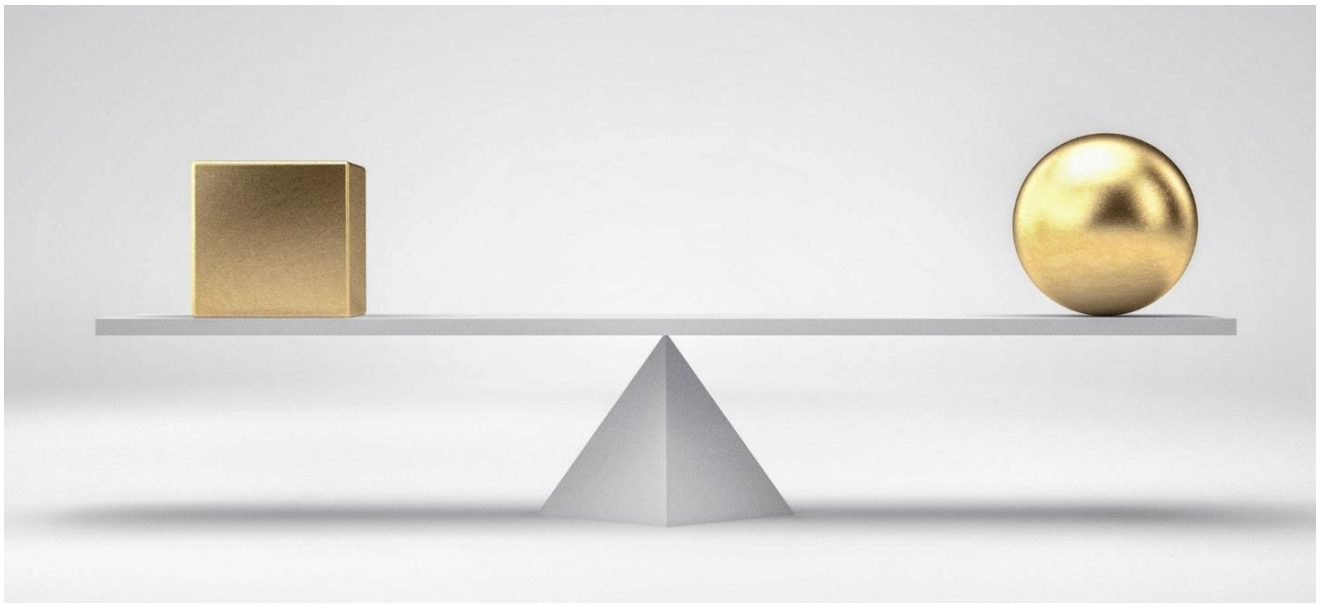
SERVICE PROPOSALS TO INTERNATIONAL CUSTOMERS



Service Proposals to International Customers in Past 5 Years

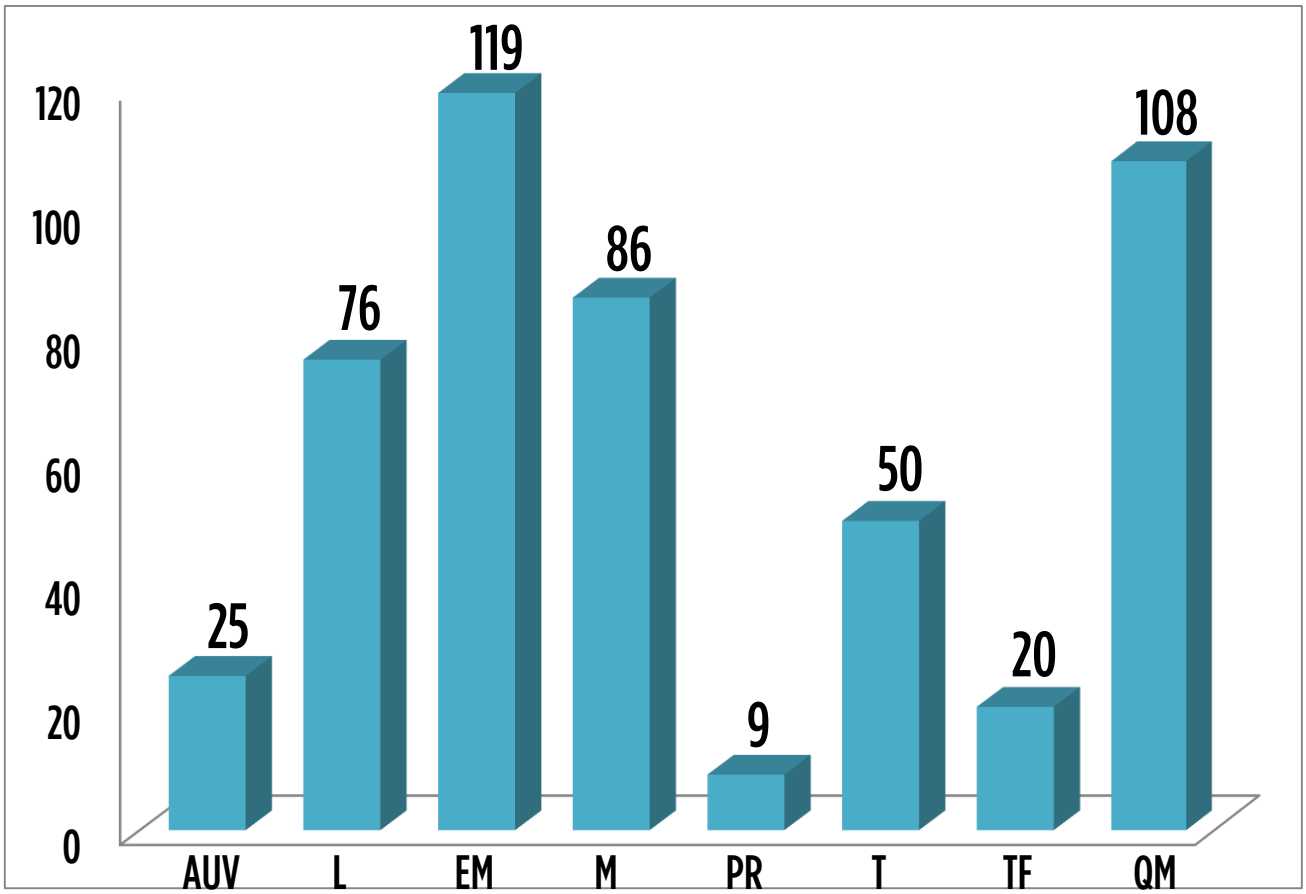


Number of International Comparisons in the Last 5 Years



CMCs PUBLISHED IN THE BIPM KEY COMPARISON DATABASE (KCDB)

TÜBİTAK UME has 493 Calibration and Measurement Capabilities (CMCs) published in the Key Compaison Database (KCDB) maintained by the BIPM. The certificates issued for calibrations encompassed by these CMCs are accepted by all other institutions that have signed the CIPM Mutual Recognition Agreement (CIPM MRA). In 2017, the number of TÜBİTAK UME's CMCs in the Chemistry area reached 108.

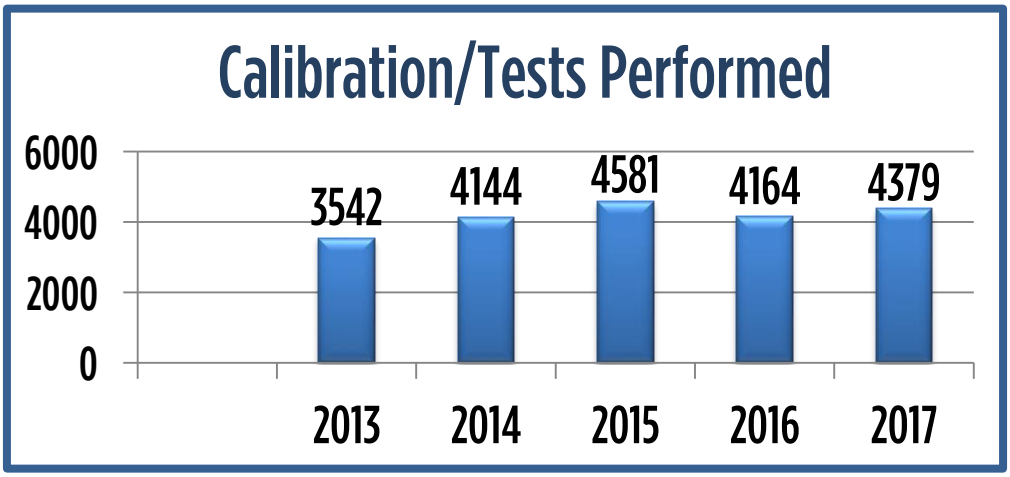


AUV Acoustics, Ultrasound & Vibration
L Length
EM Electricity & Magnetism
M Mass
PR Photometry & Radiometry
T Thermometry
TF Time & Frequency
QM Chemical Metrology

OUR SERVICES

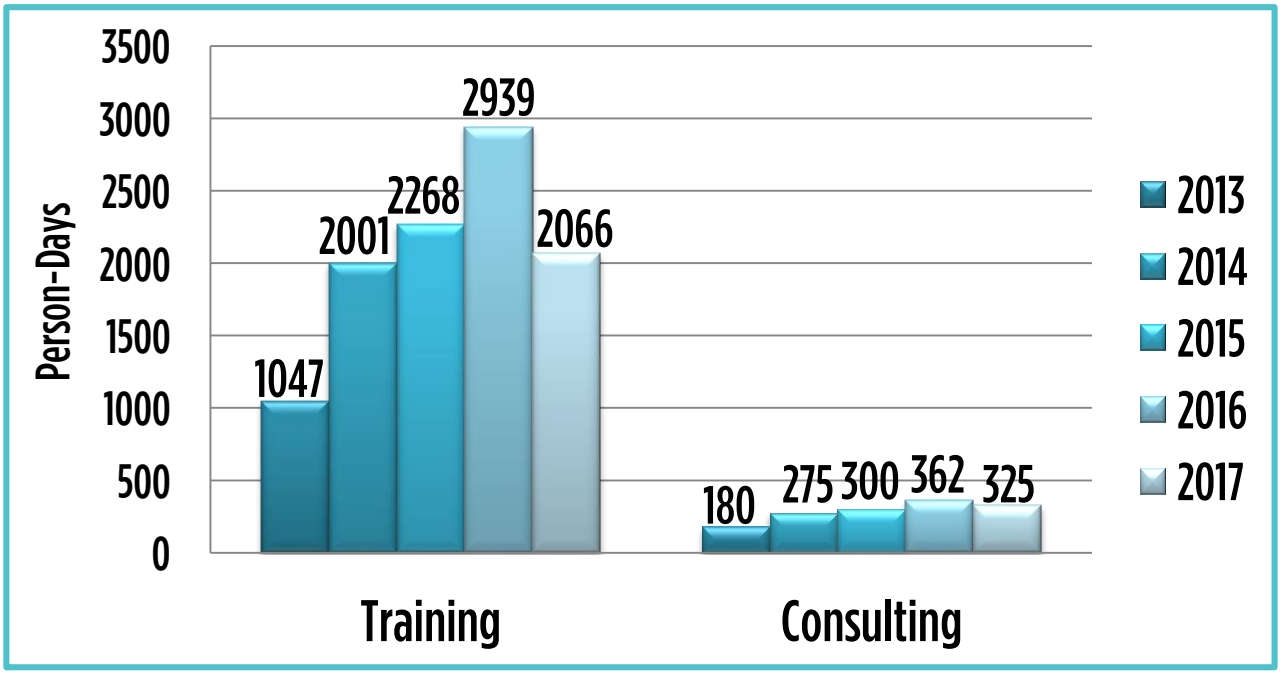
CALIBRATION AND TEST SERVICES

TÜBİTAK UME offered 638 types of calibrations / tests to customers in year of 2017. Of these services, 296 were accredited.



TRAINING AND CONSULTING SERVICES

In 2017, 2066 person-days of training services of were provided to domestic and international customers, A total of 325 person-days of consulting services were provided, of which 169 person-days were expended on support for accreditation assessments and 156 person-days on provision of on-site technical support and problem resolution



HIGHLIGHTS OF 2017

The 4th Annual Meeting of the Metrology Council operating under the Standards and Metrology Institute for Islamic Countries (SMIIC) was hosted by TÜBİTAK UME on May 8, 2017.

A Memorandum of Understanding was signed with the National Institute of Metrology (NIM) of the People's Republic of China in order to develop cooperation in scientific metrology.

Memorandums of Understanding were signed with the Russian Metrological Institute of Technical Physics and Radio Engineering (VNIIFTRI) and Russia D.I. Mendeleyev Metrology Institute (VNIIM) in order to develop the cooperation in metrology between two countries.

A tripartite Memorandum of Understanding was signed between Insitute of Metrology of Bosnia-Herzegovina (IMBIH), the General Directorate of Metrology and Standardization of the Ministry of Science, Industry and Technology of Republic of Turkey and TÜBİTAK UME for cooperation in legal metrology.

Memorandums of Understanding were signed to develop cooperation with the Uzbekistan Standardization, Metrology and Certification Authority (Uzstandard Agency) and the Central Office of Measures (GUM) of Poland.

QUALITY MANAGEMENT & ACCREDITATION

For the 12th Annual Meeting of the EURAMET Technical Committee for Quality (TC-Q) held on April 11-13, 2017 in Dublin, Ireland:

- The annual report summarizing the operation of the TÜBİTAK UME Quality Management System in 2017 was submitted to the TC-Q Secretary.
- Support was given for the preparation of 2016 annual QMS report of the Atomic Energy Agency of Turkey (TAEK).
- TUBITAK UME and TAEK's Annual Quality Management System Reports were approved unconditionally during the meeting.

On April 10, 2017, an independent external peer review of the Acoustics Laboratory of the National Metrology Laboratory of the National Standards Authority of Ireland (NSAI-NML) was performed upon their invitation. The peer review was registered under EURAMET Project 1419 as a consultation.

An accreditation surveillance audit was conducted by the Turkish Accreditation Agency (TURKAK) within the scope of AB-0034-K (Calibration) and EU-0092-T (Testing) accreditation certificates between October 9 and December 7, 2017. The audit was performed by the chief assessor and 11 technical assessors from national metrology institutes or designated institutes of various countries.

The surveillance audit was carried out in the following laboratories and areas.

- Quality Management System (AB-0034-K, AB-0092-T) (09.10.2017-07.12.2017)
- Power and Energy Laboratory (AB-0034-K) (09.10.2017)
- Electromagnetics Laboratory (AB-0092-T) (10.10.2017)
- Temperature Laboratory (AB-0034-K) (17-18.10.2017)
- Fluids Laboratory: Liquid Fluids (AB-0034-K) (23-24.10.2017)
- Voltage Laboratory (AB-0034-K) (31.10.2017)
- Impedance Laboratory (AB-0034-K) (01.11.2017)
- Pressure Laboratory (AB-0034-K) (20.11.2017)
- Vacuum Laboratory (AB-0034-K) (20.11.2017)
- Dimensional Laboratory (AB-0034-K) (21-22.11.2017)
- Fluids Laboratory: Gas Flows and Air Velocity (AB-0034-K) (28-30.11.2017)
- Force Laboratory: Force, Torque (AB-0034-K) (04-07.12.2017)
- Force Laboratory: Hardness (AB-0034-K) (04-07.12.2017)
- Mass Laboratory (AB-0034-K) (04-07.12.2017)

The Quality Documentation Management System (QDMS) software, which will move Quality Management System applications to the electronic sphere, was brought online. "QDMS General User Training" was planned in order to ensure that the software is used effectively throughout the institute and the training was carried out with participation of 157 personnel in two sessions.

The Quality Manual, procedures and instructions that meet the administrative and technical requirements of the TS EN ISO/IEC 17025 standard were prepared within the scope of the "Quality Management System Establishment and Accreditation" work package of the TEİAŞ project. Documents were prepared and the application to TÜRKAK for accreditation in the testing was submitted.

TÜBİTAK UME personnel actively participated in the "TURKAK Auditor Experience Sharing Meeting and Training" held in Istanbul on September 13-15, 2017 with presentations on the following subjects:

- Traceability of Measurements,
- Determination of Calibration Periods,
- Interpretation of Calibration Certificates.

Within the framework of cooperation with TÜRKAK, the documents EA-4/02 "Evaluation of Measurement Uncertainty in Calibration" and "Guide to Calibration Intervals of Measuring Instruments" (ILAC-G24: 2007 / OIML D10: 2007 (E) were translated and transmitted to TÜRKAK. The documents have been published on TURKAK web page.

A "TÜRKAK Measurement Uncertainty Guide Document Working Group" was formed under TÜBİTAK UME's leadership for the drafting of a guide document on the calculation of measurement uncertainty. An action plan for drafting the guide was prepared and examples of uncertainty calculations used by TÜBİTAK UME Laboratories were collected for inclusion in the document.

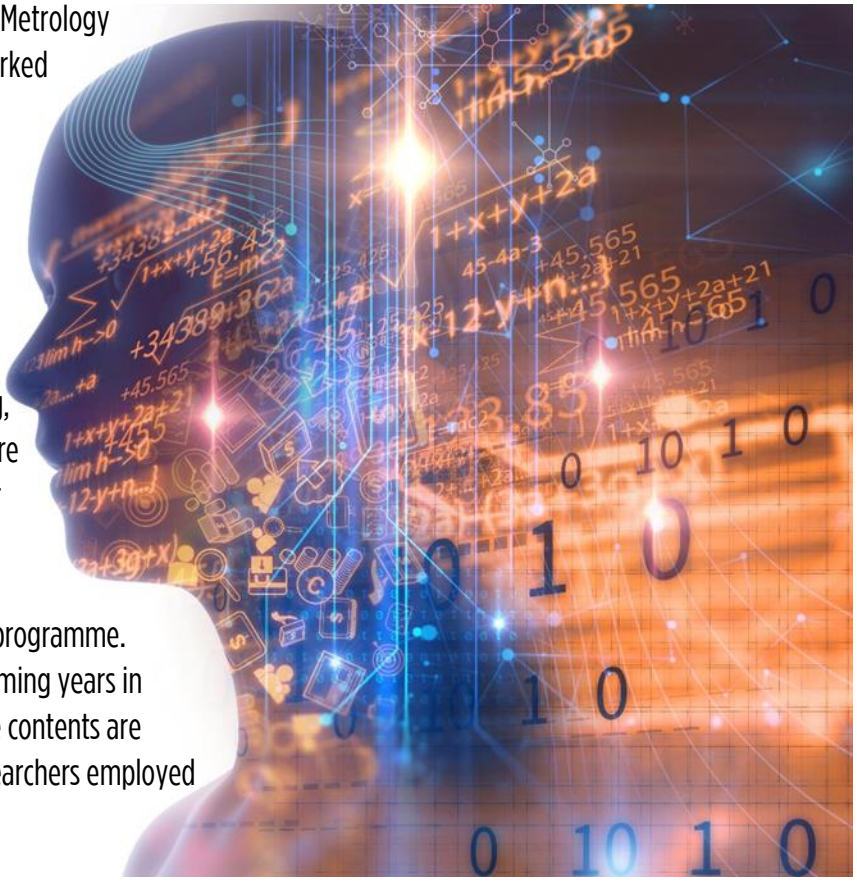
The periodic review of Quality Management System documentation, scheduled once every two years, was performed in 2017.

As a part of ongoing efforts to improve TÜBİTAK UME's Quality Management System, improvements were made in the the Quality Management System documentation. In this scope; 5 procedures, 4 instructions, 2 forms, 1 list and 5 sectios of the Quality Handbook were revised and implemented by the Quality Management Board. Additionally, 3 new forms were integrated into TUBITAK UME Quality Management System Documentation and put into use.

Within the scope of the accreditation certificate EU-0001-RM covering the production of certified reference materials, all necessary arrangements in preparation for the surveillance audit to be performed by the Turkish Accreditation Agency (TÜRKAK) in January 2018.

KNOWLEDGE & TECHNOLOGY TRANSFER

The postgraduate degree programme in Metrology offered at Gebze Technical University marked its third anniversary in 2017.



The program, aiming to train highly qualified researchers in the field of metrology, includes courses on measurement techniques used in the emerging fields of quantum metrology, nanotechnology, biomedical engineering, renewable energy technologies, which are the high-priority research subjects in our country.

Currently, 14 courses are on offer in this programme. New courses will be introduced in the coming years in accordance with identified needs. Course contents are prepared and instruction is given by researchers employed at TÜBİTAK UME.

TÜBİTAK UME researchers also act as thesis co-advisors to students of the programme, who are given access to TÜBİTAK UME laboratories to perform research. The language of instruction is English, which allows the participation of international students in the programme.

TÜBİTAK UME organized numerous business development meetings with Turkey's leading industrial establishments and public institutions in order to develop new project ideas, disseminated information through national and international symposiums, workshops and conferences and participated in various organizations in order to promote its infrastructure and technical capabilities. Presentations were made at Abant İzzet Baysal University, Kocaeli University, 19 Mayıs University, Karadeniz Technical University, Gebze Technical Unversity and Yeditepe University in outreach events aiming to raise awareness of metrology.

TÜBİTAK UME provided consultancy and training services to the General Directorate of Metrology and Standardization in support of their efforts to restructure mass (mass, high mass and weighing instruments), volume (fuel scales), fluids (fuel mastermeters) calibration services in their Adana, Ankara, Erzurum, İstanbul and Samsun regional laboratories.

In 2017, laboratory visits and metrology presentations were organized for 20 different student groups and 4 different Science Camp events were organized.

TÜBİTAK UME participated three international fairs in 2017: Expo Turkey by Qatar held in Qatar's capital city Doha onn April 18-20, 2017, Expo Turkey by Sudan held in Khartoum, Sudan on May 8-11, 2017 and the 18th International Metrology Congress (CIM 2017) in Paris on September 19-21, 2017.

TÜBİTAK UME participated in the expoMED Eurasia Fair on March 30-31, 2017, ICSG 2017 Smart Grids and Cities Congress and Fair on April 19-20, 2017, Invention and Model Exhibition on May 14, 2017, Izmir International Fair on August 19-22, 2017, Quality '17 Control, Metrology, Test Equipments and Industrial Software Fair on October 13-14, 2017, 7th International Natural Gas Congress and Fair on November 2-3, and "Turkey Again: Graduate Meeting Istanbul" on November 24-25, 2017 and contributed to spreading metrology awareness by organizing a free General Metrology Seminar for 45 participants in 2017.

2017 IN NUMBERS

54	R&D Projects
62	National and International Comparisons
28	Reference Materials and Standards
112	Measurements Quantities Measured
126	Primary Level Standards
638	Types of Calibration and Tests Offered
4379	Calibration/ Tests Performed
110	International & National Publications
123	Membership in Technical Committees
281	Employees

STEPS TO SUCCESS

TÜBİTAK UME will establish Metrology Laboratory in Sudan

An agreement was reached between TÜBİTAK UME and Sudan Standards and Metrology Organization (SSMO) to initiate projects for the establishment of Temperature and Humidity Metrology Laboratory and Calibration Systems for Medical Calibrators.

The two projects valued at 1.135 million USD provide for the turnkey establishment of the laboratory systems as well as supply of comprehensive training and consulting services and represent an important new step in TÜBİTAK UME's cooperation with emerging metrology institutes.

The project "Establishent of Temperature and Humidity Metrology Laboratory", which is scheduled to be completed in twenty-four months, will result in establishment of infrastructure for the primary and secondary level calibrations of dew point hygrometers and relative humidity meters. Upon completion of the works, SSMO will be able to perform calibrations of hygrometers and air temperature gauges with low uncertainties, within a temperature range of -10 ° C to 70 ° C and a relative humidity range of 10% RH to 95% RH. SSMO will also have the ability to perform primary level calibrations of dew point hygrometers within a temperature range of -30 ° C to 60 ° C dew point.

In the area of thermometry, SSMO will be able to perform calibrations of industrial resistance thermometers, thermocouples, liquid-glass thermometers and temperature-controlled volumes of digital thermometers within a temperature range of -40 ° C to 550 ° C with low uncertainties.

The project to establish systems for the calibration of medical calibrators will be implemented in two phases over three years. Twelve different high-end systems will be supplied with the aim of providing the necessary services to ensure the accuracy of medical measurements in Sudan's medical care system.

The agreement with SSMO demonstrates TÜBİTAK UME's growing capability to provide sophisticated technical assistance to developing NMIs and its increasing international presence in the field of metrology.

New Reference Instrument Produced by TÜBİTAK UME

The "Harmonic Current Source" developed within the the European Metrology Research Programme project entitled "EMC Tests for Industrial Environments" (IND60 EMC) coordinated by TÜBİTAK UME was displayed at the EURAMET stand in the 18th International Metrology Congress (CIM 2017) held in Paris between September 19 and 21, 2017.

The reference instrument, designed and produced by TÜBİTAK UME, has been tested in a measurement comparison between the laboratories of the project partners with successful results. The "Harmonic Current Source" has many innovative features and will be used to generate and measure defined current harmonics. TÜBİTAK UME has applied for a patent for the instrument.

The IND60 EMC project focused on the development of alternative testing methods for utilization in electromagnetic compatibility (EMC) testing, which is a requirement for all electronic products, with the particular aim of resolving the problem resulting from the fact that many instruments with large components subject to EMC testing fall outside the scope of current directives. Moreover, there was little information about performance analysis, characterization, validity and traceability of the results obtained from available testing methods. The IND60 EMC project resulted in the development of new methods and the improvement of existing methods for EMC testing to address these deficiencies. The new and improved methods were validated with with the reference instruments that were produced as deliverables of the project.

The Harmonic Current Source, one of these reference instruments, was exhibited at the 18th International Congress on Metrology, which is one of the most significant annual international events in the world of metrology.

Cooperation between TÜBİTAK UME and BIPM in Capacity Building

Bureau International des Poids et Mesures

TÜBİTAK UME and the BIPM agreed to cooperate on a programme to offer long term project placements to metrologists from emerging metrology institutes within the framework of the BIPM's Capacity Building and Knowledge Transfer Programme.

Under the programme, named "TÜBİTAK UME – BIPM Project Placements", TÜBİTAK UME is to offer ten selected metrologists from countries that have either newly signed the CIPM MRA or have the prospect of doing so in the near term the opportunity to perform research in TÜBİTAK UME laboratories for periods ranging from one month to three months for two separate terms in 2018 and 2019.

Within the application period in the fall of 2017 for the 2018 term of the programme, a total of 58 applications from 23 countries were received. Of the 58 applications, 44 were considered acceptable under the terms of the programme.

After the evaluation of the applications, 10 metrologists were accepted to participate in the programme in 2018. The selected applicants were Mr. Frank Eric Anang from the Ghana Standards Authority, who will perform research in the field of temperature metrology, Ms. Shima Zanganeh from the National Metrology Center of Iran, who will study voltage measurements, Ms. Shamsa Alkayoomi from the Emirates Metrology Institute, who will study electrical resistance measurements, Ms. Merima Causevic from the Institute of Metrology of Bosnia – Herzegovina, who will perform research in fluid flow measurements, Mr. Dagmawi Woldetensai Berhe from the National Metrology Institue of Ethiopia, who will perform research on determination of volume and density of mass standards, Ms. Natasha Sichone from the

Zambia Bureau of Standards, who will study gauge block measurements, Mr. Marat Ustemirov from the Kazakhstan Intitute of Metrology, who will study in the area of pressure metrology, Mr. Thomas Olala from the Kenya Bureau of Standards, who will study radio frequency and microwave metrology, Mr. Faisal Alqahtani of the National Measurement and Calibration Center of the Saudi Standards, Metrology and Quality Organization, who will study in the area of dimensional metrology and Ms. Alena Bayenskaya of the Belarussian State Institute of Metrology, who will study electrical power measurements.

The first term of the program, which will be realized as two terms in 2018 and 2019, will start on April 1, 2018. The research programs will be tailored to the needs and interests. Participants will also benefit from a two day seminar focused on the CIPM Mutual Recognition Arrangement offered by BIPM and TÜBİTAK UME specialists.

The programme aims to support capacity building in emerging national metrology institutes through in depth knowledge transfer to technical personnel in areas of interest to the personnel and their insitutes and to enhance their engagement with the international metrology community and the BIPM.

The "BIPM – TÜBİTAK UME Project Placements" are being offered as TÜBİTAK UME's contribution to the Capacity Building and Knowledge Transfer (CBKT) Programme implemented by the BIPM, which aims to increase the visibility and participation of emerging metrology systems in the world-wide metrology community. Other contributors to the CBKT Programme include NIST of the United States, PTB of Germany, METAS of Switzerland, NIM of China and NMISA of South Africa.

Applications for the second term of the programme, to begin in 2019, will be accepted in Fall 2018.

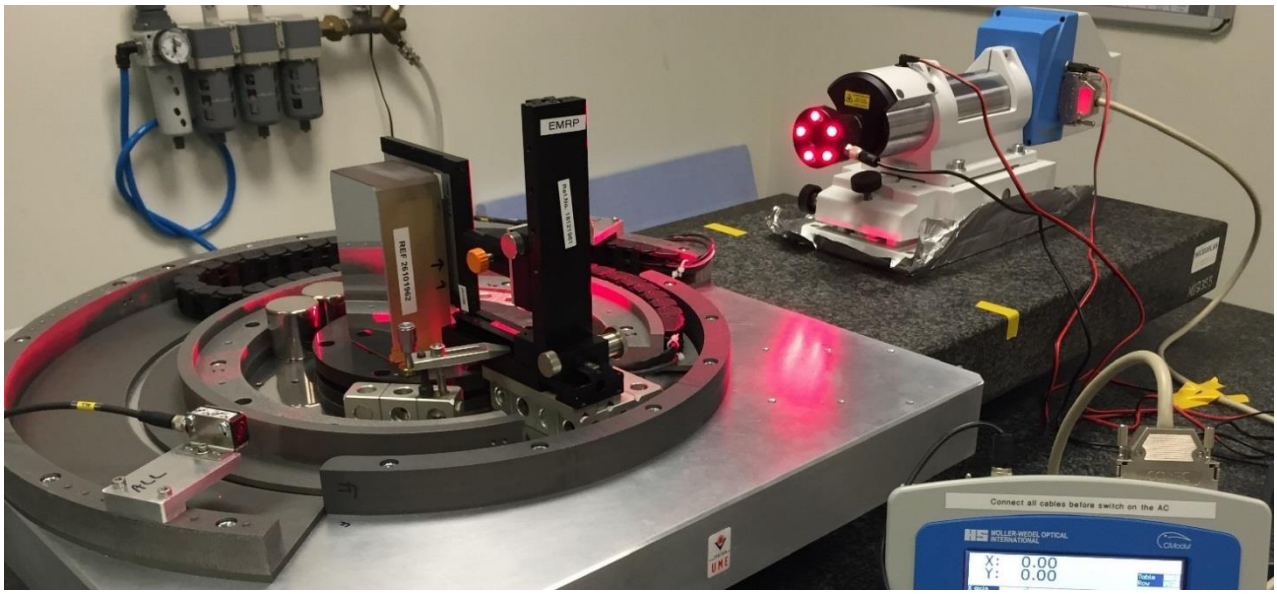
European Calibration Guide prepared under the leadership of TÜBİTAK UME

EURAMET issued a new guide in 2017 for the calibration of autocollimators that was prepared by a team led by a researcher from TÜBİTAK UME.

“Calibration of Autocollimators”, EURAMET Calibration Guide No. 22, was a deliverable of the European Metrology Research Programme funded joint research project entitled Angle Metrology (SIB58 Angle) that was coordinated by Dr. Tanfer Yandayan of TÜBİTAK UME and joined by 16 partner institutions.

The calibration guide was prepared by drawing on the research performed within the SIB58 Angles project on high accuracy, nanoradian-scale angle measurements as well as previous studies performed by TÜBİTAK UME and partner institutes and addresses the needs of a wide array of metrology stakeholders, from secondary level laboratories to scientific laboratories engaged in cutting edge research.

The subject of the calibration guide, autocollimators, have a range of applications in high-end scientific research and the aerospace and defense industries, in addition to their uses for calibration of angle standards and devices and angular measurements and precise adjustment of various optical components used in industry.



The European Accreditation Association calibration guidebooks, known as "EAL or EA Calibration Guides” were taken over by EURAMET, who had been drafting them, and were renamed “EURAMET Calibration Guides" beginning in the mid – 2000s.

TÜBİTAK UME Contributes to Guidebook in the field of Medical Metrology

TÜBİTAK UME contributed to a guide book focusing on the drafting of regulations for systems of verification for medical devices that was published in 2017.

The 289 paged book named "Inspection of Medical Devices: For Regulatory Purposes" edited by Almir Badnjević, Mario Cifrek, Ratko Magjarević and Zijad Džemić was published by Springer with ISBN 978-981-10-6650-4. The section "Inspection and Testing of Respirators and Anesthesia Machines" (20 pages) was authored Dr. Baki Karaböce, Chief Researcher and Head of the Medical Metrology Laboratory at TÜBİTAK UME.

In addition to the renowed biomedical engineering expert Dr. Almir Badnjević and the Director of the Institue of Metrology of Bosnia - Herzegovina, Zijad Džemić, Prof. Mario Cifrek from Zagreb University and Dr. Ernesto Ladanza from the University of Florence, both important experts in the subject area, contributed to the book.

The book is a globally applicable guide to implementing robust verification systems for medical devices that conform to various regulatory frameworks. It presents the means and methods for expanding and enhancing legal metrology systems to appropriately encompass medical devices, addressing verification of their safety and performance, and highlights the benefits of doing so to national healthcare systems in terms of increased economic efficiency as well as reliability of medical diagnoses and treatments.

New Photovoltaic Test Center Completed

The final stage was reached in the long running project carried out by the Optics Laboratory of TÜBİTAK UME to establish a Photovoltaic Test Center.

The infrastructure development project aimed at establishing facilities to perform reliability and safety tests on solar panels used to generate electricity from solar energy, among the most important of renewable energies, was started in 2012 with the support of the Ministry of Development. In the project, the establishment of the test laboratories and performance tests on the installed measurement systems were completed in 2017 and preparations for the accreditation of the new facility were began.

The project to establish the Photovoltaic Test Center encompasses the installation of measurement systems to conduct performance and safety tests on crystalline silicon and thin-film terrestrial photovoltaic modules in conformity with the IEC 61215-2 and IEC 61730-2 standards, the improvement of the existing infrastructure at TÜBİTAK UME to establish the necessary measurement traceability of the new systems, and the implementation of a quality management system in compliance with TS EN ISO 17025 so that the new test center may issue test certificates.

In line with project objectives, measurement systems were procured and installed to establish a facility capable of providing 19 different performance tests and 25 different safety tests specified in the IEC 61215-2 and IEC 61730-2 standards. The new measurement systems were calibrated in order to establish their traceability to TÜBİTAK UME, and finally, quality system documentation was prepared and an application was submitted to TÜRKAK for accreditation.

Additionally, TÜBİTAK UME began participation in a number of bilateral international measurement comparisons to ensure the international equivalency of the measurements obtained with the newly installed systems and is participating in selected EMPIR JRPs in order to further improve its infrastructure in photovoltaic measurements and prepare for expected increases in demand for such measurements in the future.

A Forward Jump in Research Infrastructure

TÜBİTAK UME has launched a new "Research Infrastructure Renewal and Development Project" as an extension of its efforts to secure a position at the forefront of developments critical to the future of the world of metrology such as the redefinition of the SI units.

The project aims to address the concern that the primary level standards currently maintained by TÜBİTAK UME laboratories will be demoted to secondary level with the expected redefinition of the kilogram, kelvin, mole, ampere in 2018, consequently giving rise to dependence on new primary standards abroad for metrological traceability to the SI units, and to ensure that TÜBİTAK UME keeps pace with the latest developments in metrology. The project will support TÜBİTAK UME's Watt Balance project that was initiated in 2014 and also establish new infrastructure for the measurement of fundamental physical constants and thermodynamic quantities.

The target infrastructure to be established within the framework of quantum metrology will be mainly used in activities to establish primary standards in conformity with the redefinition of the SI units (Kilogram, Amper, Kelvin and Mol) and in the production of the semiconductor resistance standard based on the Quantum Hall effect, the voltage standard measured by Josephson effect and the current standard defined by semiconductor and superconducting single electron devices. These standards will form the "quantum metrological triangle" that is necessary for the realization of the redefined Ampere unit. The new infrastructure will also be used for the production and measurement of semiconductor "quantum dot thermometers" and superconducting "Coulomb blocking thermometers" for the realization of the redefined of Kelvin unit. The establishment of this infrastructure will alo create new opportunities for the production and measurement of standards in magnetism, optoelectronics, high frequency metrology and nano-metrology at TÜBİTAK UME.

Impact Study on the TÜBİTAK UME's Investment in New Infrastructure

An impact analysis study was undertaken in 2017 to evaluate the outputs of TÜBİTAK UME's activities, to determine the contribution of these activities to the Turkish economy and to assess the potential impact of planned investments in the expansion of TÜBİTAK UME's infrastructure.

Within the scope of the analysis study done by Prof. Dr. Erol TAYMAZ, an "ex ante" impact analysis of the metrological services to be offered by TÜBİTAK UME as an outcome of planned investments in new infrastructure was conducted.

The study relied on open source data as well as data obtained through targeted surveys to conclude that a strong, positive correlation exists between increasing sophistication in metrology, as indicated by international measurement comparisons, accumulated scientific expertise in metrology, calibration and measurement capabilities and production of measurement instruments, and economic growth.

It is unquestionably important for TÜBİTAK UME to be able to possess the technical expertise and hardware to offer the necessary calibration services to enable the functioning and growth of accredited secondary level calibration, test and analysis laboratories in Turkey. The planned investments are projected to support in a 24% increase in the number of CMCs declared by TÜBİTAK UME, concentrating on areas in which Turkish accredited laboratories and R&D centers are currently most dependent on foreign suppliers.

The study also concluded that a 1% increase in CMCs corresponded to a %1 increase in production and exports of measurement equipment. Based on this, a 24% expansion in production of measurement equipment and supply of measurement services over the next 10 years is predicted as a result of TÜBİTAK UME's planned infrastructure investments, which yields an estimated benefit-cost ratio of 12.

PUBLICATIONS AND PATENTS

SCI Articles

83 articles by TÜBİTAK UME researchers were published in SCI journals in 2017.

1. Yalcinkaya, B., Yumbul, E., Mozioglu, E., Akgoz, M. "Comparison of DNA Extraction Methods for Meat Analysis", Food Chemistry, 221:- (2017) : 1253-1257
2. Ma, L.D., Wang, J., Wei, C., Kuroiwa, T., Narukawa, T., Ito, N., Hioki, A., Chiba, K., Yim, Y.H., Lee, K.S., Lim, Y.R., Turk, G.C., Davis, C.W., Mester, Z., Yang, L., Mccooeye, M., Maxwell, P., Cankur, O., Tokman, N., Coskun, F.G. "Report of the CCQM-K97: Measurement of Arsenobetaine Standard Solution and Arsenobetaine Content in Fish Tissue (Tunafish)", Metrologia, 54:Technical Supplement (2017) : 08003
3. Vatansever, B., Muñoz, A., Klein, C.L., Reinert, K. "Development and Optimisation of a Generic Micro LC–ESI-MS Method for the Qualitative and Quantitative Determination of 30-Mer Toxic Gliadin Peptides in Wheat Flour for Food Analysis", Journal of Analytical and Bioanalytical Chemistry, 409:4 (2017) : 989–997
4. Quabis, S., Schulz, M., Ehret, G., Asar, M., Balling, P., Kren, P., Bergmans, R.H., Kung, A., Lassila, A., Putland, D., Williams, D., Piree, H., Prieto, E., Perez, M., Svedova, L., Ramotowski, Z., Vannoni, M., Hungwe, F., Kang, Y. "Intercomparison of flatness measurements of an optical flat at apertures of up to 150 mm in diameter", Metrologia, 54:1 (2017) : 85-93;
5. Kuroiwa, T., Zhu, Y., Inagaki, K., Long, S., Christopher, S., Puelles, M., Borinsky, M., Hatemleh, N., Murby, J., Merrick, J., White, I., Saxby, D., Sena, R.C., Almeida, M.D., Vogl, J., Phukphatthanachai, P., Fung, W.H., Yau, H.P., Okumu, T.O., Kang'Iri, J.N., Telles, J.A.S., Campos, E.Z., Galvan, E.C., Kaewkhomdee, N., Taebunpakul, S., Thiengmanee, U., Yafa, C., Tokman, N., Tunc, M., Can, S.Z. "Report of the CCQM-K123: Trace Elements in Biodiesel Fuel", Metrologia, 54:Technical Supplement (2017) : 08008Yalcinkaya, B., Yumbul, E., Mozioglu, E., Akgoz, M. "Comparison of DNA Extraction Methods for Meat Analysis", Food Chemistry, 221:- (2017) : 1253-1257

6. Gokcen, T., Al, M., Topal, M., Gulcin, I., Ozturk, T., Goren, A.C. "Synthesis of Some Natural Sulphonamide Derivatives as Carbonic Anhydrase Inhibitors", Organic Communications, 10:1 (2017) : 15-23

7. Torres, M.R.A., Manzano, J.V.L., Moya, E.V., Horvat, M., Jaćimović, R., Zuliani, T., Vreča, P., Acosta, O., Bennet, J., Snell, J., Buzoianu, M., De Sena, R.C., Almeida, M.D., De Sena, R.C., Dutra, E.S., Yang, L., Li, H., Chao, J., Fisicaro, P., Guillaume, L., Yau, M.H., Fung, W., Aggarwal, S.G., Miyashita, S., Uribe, C., Cankur, O., Buzoianu, M., Cankur, O., Can, S.Z., Can, S.Z., Caceres, G.C., Uribe, C., Buzoianu, M., Konopelko, L., Linsky, M., Winchester, M., Rabb, S.A., Murphy, K.E., Cankur, O., Okumu, T.O., Konopelko, L., Linsky, M. "Key Comparison CCQM-K127 : Contaminant and Other Elements in Soil ", Metrologia, 54:Technical Supplement (2017) : 08010

8. Can, S.Z., Merrick, J., Coskun, F.G., Saxby, D., Tunc, M., Dutra, E.S., De Sena, R.C., De Oliveira Araujo, T., De Almeida, M.D., Yang, L., Pihillagawa, I.G., Mester, Z., Sandoval, S., Lampi, E., Wei, C., Del Castillo, E., Oster, C., Fisicaro, P., Rienitz, O., Pape, C., Schulz, U., Jahrling, R., Gorlitz, V., Lampi, E., Kakoulides, E., Sin, D.W., Can, S.Z., Coskun, F.G., Tunc, M. "Final report on CCQM-K125: Elements in Infant Formula", Metrologia, 54:Technical Supplement (2017) : 08013

9. Kuroiwa, T., Fung, W.H., Zhu, Y., Inagaki, K., Sin, D.W., Chu, H.S., Saxby, D., Merrick, J., White, I., Araujo, T., Almeida, M.D., Rodrigues, J., Yang, L., Pihillagawa, I.G., Mester, Z., Riquelme, S.S., Perez, L., Barriga, R., Nunez, C., Chao, J., Wang, J., Wang, Q., Can, S.Z., Ari, B., Cankur, O. "Report of the CCQM-K124: Trace Elements and Chromium Speciation in Drinking Water—Part A: Trace Elements in Drinking Water, part B: chromium speciation in drinking water", Metrologia, 54:Technical Supplement (2017) : 08014

10. Karaboce, B., Cetin, E., Durmus, H.O., Ozdingis, M. "Investigation of the Temperature Effect of Ultrasound Used in Cancer Therapy", IEEE Conference Publications, -:DOI: 10.1109/TIPTEKNO.20 (2017) : 1-4

11. Karaboce, B., Ozdingis, M., Durmus, H.O., Cetin, E. "Portable Ultrasonic Wattmeter For Ultrasonic Prob Calibration", IEEE Conference Publications, -:DOI: 10.1109/TIPTEKNO.201 (2017) : 1-4

12. Fidan, E., Fidan, E., Kucur, O., Fidan, O., Kucur, O. "Performance of Two-Way Relay Networks with Generalized Transmit and Receive Antenna Selection over Rayleigh Fading Channels", Wireless Personal Communications, 94:1 (2017) : 1-17.

13. Ghasemi, N., Secen, H., Yilmaz, H., Binici, B., Goren, A.C. "Determination of Neurotoxic Agents as Markers of Common Vetch Adulteration in Lentil by LC-MS/MS", Food Chemistry, 221:1 (2017) : 2005-2009.

14. Josephs, R.D., Li, M., Song, D., Westwood, S., Stoppacher, N., Flatschart, R., Oliveira, R., Melanson, J.E., Ohlendorg, R., Henrion, A., Kinumi, T., Wong, L., Liu, Q., Oztug Senal, M., Vatansever, B., Un, I., Goren, A.C., Akgoz, M., Quaglia, M., Warren, J. "Key Comparison Study on Peptide Purity—Synthetic Human C-Peptide", Metrologia, 54:Technical Supplement (2017) : 08007

15. Un, I., Goren, A.C. "Accurate Determination of Ethanol in Water by qNMR: Validation and Uncertainty Assessment", Journal of Chemical Metrology, 11:1 (2017) : 9-15

16. Josephs, R.D., Stoppacher, N., Westwood, S., Wielgosz, R., Li, M., Quaglia, M., Melanson, J.E., Marcos, G., Prevoo, D., Wu, L., Scapin, S., Oztug Senal, M., Wong, L., Jeong, J., Yi Chan, K.W., Arsene, C.G., Park, S. "Concept Paper on SI Value Assignment of Purity-Model for the Classification of Peptide/Protein Purity Determinations", Journal of Chemical Metrology, 11:1 (2017) : 1-8

17. Nasibli, H., Diril, A., Pehlivan, O., Kalemci, M. "Comparative Study of Two InGaAs-Based Reference Radiation Thermometers", International Journal of Thermophysics, 38:7 (2017) : 1-13

18. Gulnihar, K., Cekli, S., Uzunoglu, C.P., Ugur, M. "Location Estimation of Partial Discharge-Based Electromagnetic Source Using Multilateration with Time Difference of Arrival Method", Electrical Engineering, -:DOI: 10.1007/s00202-017-0 (2017) : 1-9

19. Karaboce, B., Sadikoglu, E., Bilgic, E. "Characterization and Clinical Trials of the Prototype Ear Simulator Designed for Neonates Hearing Assessment", Acoustics Australia, 3:7 (2017) : 1-8

20. Cakir, S., Sen, O., Tektas, C.B., Cetintas, M. "Investigation of Different Alternative Radiated Immunity Test Methods", IEEE Electromagnetic Compatibility Magazine, 6:1 (2017) : 48-55

21. Van Der Hout, J.W., Van Der Veen, A.M.H., Ziel, P.R., Kipphardt, H., Tuma, D., Maiwald, M., Fernández, T.E., Gómez, C., Cieciora, D., Ochman, G., Dias, F., Silvino, V., Macé, T., Sutour, C., Marioni, F., Ackermann, A., Niederhauser, B., Fuk?, J., Buki, T., Szilágy, Z.N., Tarhan, T., Engin, T.E. "International Comparison Euramet.QM-K111—Propane in Nitrogen", Metrologia, 54:Technical Supplement (2017) : 08020

22. Pavsic , J., Devonshire, A., Blejec , A., Foy , C., Heuverswyn , F., Jones , G., Schimmel , H., Zel, J., Huggett, J., Redshaw , N., Karczmarczyk , M., Mozioglu, E., Akyurek, S., Akgoz, M., Milavec , M. "Inter-Laboratory Assessment of Different Digital PCR Platforms for Quantification of Human Cytomegalovirus", Analytical and Bioanalytical Chemistry, 409:10 (2017) : 2601-2614

23. Baykal, A., Auwal, I., Guner, S., Sozeri, H. "Magnetic and Optical Properties of Zn2+ Ion Substituted Barium Hexaferrites", Journal of Magnetism and Magnetic Materials, 430:May (2017) : 29-35

24. Baykal, A., Yokus, S., Guner, S., Gungunes, H., Sozeri, H., Amir, M. "Magneto-Optical Properties and Mössbauer Investigation of BaxSryPbzFe12019 Hexaferrites", Ceramics International, 43:4 (2017) : 3475-3482

25. Can, H., Svec, P.J., Ján , B., Svec, P.S., Sozeri, H., Topal, U. "Systematic Optimization of the Sensing Properties of Ring-Core Fluxgate Sensors with Different Core Diameters and Materials", Sensors and Actuators, A: Physical, 255:1 March (2017) : 94-103

26. Auwal, I., Baykal, A., Guner, S., Sozeri, H. "Magneto-Optical Properties of SrBixLaxFe12-2x019 ($0.0 \leq x \leq 0.5$) Hexaferrites by Sol-Gel Auto-Combustion Technique", Ceramics International, 43:1 (2017) : 1298-1303

27. Koksal, E., Ercan, B., Gulcin, I., Korkmaz, M., Caglayan, C., Goren, A.C., Alwasel, S.H. "Antioxidant Activity and Polyphenol Content of Turkish Thyme (Thymus vulgaris) Monitored by Liquid Chromatography and Tandem Mass Spectrometry ", International Journal of Food Properties, 20:3 (2017) : 514-525

28. Eroglu, M.S., Oner, E.T., Mutlu, E.C., Bostan, M.S. "Sugar Based Biopolymers in Nanomedicine; New Emerging Era for Cancer Imaging and Therapy", Current Topics in Medicinal Chemistry, 17:3 (2017) : 1507-1520

29. Turkoglu, G., Cinar, M.E., Ozturk, T. "Organoboron Copolymers Containing Thienothiophene and Selenophenothiophene Analogues : Optical, Electrochemical and Fluoride Sensing Properties", RSC Advances, 7:37 (2017) : 23197-23207

30. Ustamehmetoglu, B., Osken, I., Cinar, M., Sezer, E., Karaca, E., Ozturk, T. "Synthesis and Characterization of Dithienothiophene, Bithiazole and Thiophene Containing Polymer ", Electrochimica Acta, 227:10 February (2017) : 435-446

31. Sahin, O., Cinar, M., Tekin, E., Mucur, S., Topal, S., Suna, G., Eroglu, M.S., Ozturk, T. "White Light Emitting Polymers Possessing Thienothiophene and Boron Units", ChemistrySelect, 2:10 (2017) : 2889-2894

32. Culhaoglu, B., Caban, A., Boga, M., Ozturk, M., Ozturk, T., Topcu, G. "Antioxidant and Anticholinesterase Activities of Some Dialkylamino Substituted 3-Hydroxyflavone Derivatives", Medicinal Chemistry, 13:1 (2017) : 1-6

33. Koksal, Z., Kalin, R., Camadan, Y., Usanmaz, H., Almaz, Z., Gulcin, I., Gokcen, T., Goren, A.C., Ozdemir, H. "Secondary Sulfonamides as Effective Actoperoxidase Inhibitors", Molecules, 22:793 (2017) : 1-9

34. Yilmaz, H., Carikci, S., Kilic, T., Dirmenci, T., Arabaci, T., Goren, A.C. "Screening of Chemical Composition, Antioxidant and Anticholinesterase Activity of Section Brevifilamentum of Origanum (L.) Species ", Records of Natural Products, 11:5 (2017) : 439-455

35. Balkan, I.A., Ilter Akulke, A.Z., Bagatur, Y., Telci, D., Goren, A.C., Kirmizibekmez, H., Yesilada, E. "Sambulin A and B, Non-Glycosidic Iridoids from Sambucus Ebulus, Exert Significant in Vitro Anti-Inflammatory Activity in LPS-Induced RAW 264.7 Macrophages Via Inhibition of MAPKs's Phosphorylation", Journal of Ethnopharmacology, 206:1 (2017) : 347-352

36. Baykal, A., Sozeri, H., Gungunes, H., Auwal, I., Shirsath, S., Sertkol, M., Amir, M. "Synthesis and Structural and Magnetic Characterization of BaZnxFe12—x019 Hexaferrite: Hyperfine Interactions", Journal of Superconductivity and Novel Magnetism, 30:6 (2017) : 1585-1592

37. Osman, A., Oner, E., Eroglu, M.S. "Novel Levan and pNIPA Temperature Sensitive Hydrogels for 5-ASA Controlled Release", Carbohydrate Polymers, 165:June (2017) : 61-70

38. Tohma, H., Gulcin, I., Bursal, E., Goren, A.C., Alwasel, S., Koksal, E. "Antioxidant Activity and Phenolic Compounds of Ginger (Zingiber officinale Rosc.) Determined by HPLC-MS/MS(", Journal of Food Measurement and Characterization, 11:2 (2017) : 556-566

39. Sagir, Z., Carikci, S., Kilic, T., Goren, A.C. "Metabolic Profile and Biological Activity of Sideritis Brevibracteata P. H. Davis Endemic to Turkey", International Journal of Food Properties, -: http://dx.doi.org/10.108 (2017) : 1-12

40. Tutuncu, H.E., Oztug, M., Celik Balci, N., Tuter, M., Karaguler, N.G. "Function Based Metagenomics Approach for Obtaining Lipase from Acid Mine Drainage Site", International Journal Series in Engineering Science , 3:1 (2017) : 1-20

41. Sariyerli, G.S., Akcadag, U.Y., Sakarya, O. "The Automatization of Alignment System for Calibration of Hydrometers", Acta Physica Polonica A, 131:6 (2017) : 1466-1469

42. Akkus Ozen, S., Yaman, M. "Examination of Correlation between Histidine, Sulfur, Cadmium, and Cobalt Absorption by Morus L., Robinia pseudoacacia L., and Populus nigra L.", Communication in Soil Science and Plant Analysis, -:DOI:10.1080/00103624.2017 (2017) : 1-9

43. Cetintas, M., Celik, M. "Long-Range Displacement Measurements Using Sideband Modulation Method", Measurement Science and Technology, 28:7 (2017) : 075202

44. Alpaslan Kosemen, Z., Kosemen, A., Ozturk, S., Canimkurbey, B., Yerli, Y. "High Mobility and Low Operation Voltage Organic Field Effect Transistors by Using Polymer-Gel Dielectric and Molecular Doping", Materials Science in Semiconductor Processing, 66:August (2017) : 207-211

45. Gulce Coker, E., Can, H., Topal, U. "Magnetic and Low DC Field Sensing Analysis of Cobalt-Doped YBCO Superconductors as the Core of Fluxgate-Type Sensors", Journal of Superconductivity and Novel Magnetism, 30:8 (2017) : 2329-2333

46. Canimkurbey, B., Alpaslan Kosemen, Z., Cakirlar, C., San, S.E., Yasin, M., Berber, S., Kosemen, A. "Fabrication and Investigation of P3HT:PCBM Bulk Heterojunction Based Organic Field Effect Transistors Using Dielectric Layers of PMMA:Ta2O5 Nanocomposites", Microelectronic Engineering, 180:August (2017) : 65-70

47. Vyprachtick, D., Demirtas, I., Dzhabarov, V., Pokorná, V., Ertas, E., Ozturk, T., Cimrova, V. "New Copolymers with Thieno[3,2-b]Thiophene or Dithieno[3,2-b:2′,3′-d]Thiophene Units Possessing Electron-Withdrawing 4-Cyanophenyl Groups: Synthesis and Photophysical, Electrochemical, and Electroluminescent Properties", Journal of Polymer Science, Part A : Polymer Chemistry, 55:16 (2017) : 2629-2638

48. Yildiz, G., Aydogmus, Z., Cinar, M.E., Senkal, F., Ozturk, T. "Electrochemical Oxidation Mechanism of Eugenol on Graphene Modified Carbon Paste Electrode and its Analytical Application to Pharmaceutical Analysis", Talanta, 173:October (2017) : 1-8

49. Burmaoglu, S., Secinti, H., Mozioglu, E., Goren, A.C., Altundas, R., Secen, H. "Syntheses and Evaluation of Multicaulin and Miltirone like Compounds as Antituberculosis Agents", Journal of Enzyme Inhibition and Medicinal Chemistry , 32:1 (2017) : 878-884

50. Aslan, C., Alrobaish, A.M., Sen, O. "Bilateral Comparison on Electric Field Measurements Between TÜBİTAK UME and SASO NMCC", Metrologia, 54:Technical Supplement (2017): 1-41

51. Durgut, Y., Bagci, E., Aksahin, E., Ince, A.T. "An Investigation on Characterization of Dynamic Pressure Transducers Using Material Impact Test Machine", Journal of the Brazilian Society of Mechanical Sciences and Engineering, 39:9 (2017) : 3645–3655

52. Karaboce, B., Durmus, H.O., Cetin, E., Ozdingis, M. "Calibration of Therapeutic Ultrasonic Transducers with the Modified Radiation Force Balance System (IEEE International Symposium on Medical Measurements and Applications, MeMeA 2017)", IEEE Conference Publications , -:DOI: 10.1109/MeMeA.2 (2017) : 83-87

53. Karaboce, B., Cetin, E., Durmus, H.O., Ozdingis, M., Korkmaz, H., Altun, J., Argun, S. "Experimental Investigations of Viscous Heating Effect of Thermocouples Under Focused Ultrasound Applications (IEEE International Symposium on Medical Measurements and Applications, MeMeA 2017)", IEEE Conference Publications , -:DOI: 10.1109/MeMeA.2 (2017) : 88-93

54. Turkoglu, G., Cinar, M.E., Ozturk, T. "Synthesis and Photophysical and Anion-Sensing Properties of Triarylborane-Substituted Cross-Conjugated and Conjugated Thienothiophenes", European Journal of Organic Chemistry , -:31 (2017) : 4552–4561

55. Ozturk, S., Icin, K., Ozturk, B., Topal, U., Kaftelen Odabasi, H., Gobuluk, M., Cora, O.N. "Enhanced Magnetic Properties of Nd15Fe77B8 Alloy Powders Produced by Melt-Spinning Technique", Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science, -:DOI:10.1007/s11661-017-42 (2017) : 1-14

56. Amir, M., Korkmaz, A., Baykal, A., Geleri, M., Sozeri, H., Gungunes, H., Sertkol, M., Shirsath, S. "Magnetic Properties of FeMnyCoyFe2—2y04@Oleylamine Nanocomposite with Cation Distribution", Journal of Inorganic and Organometallic Polymers and Materials, -:DOI:10.1007/s10904-017 (2017) : 1-10

57. Teo, T.L., Gui, E.M., Cheow, P.S., Giannikopoulou, P., Kakoulides, E., Lampi, E., Choi, S., Yip, Y., Chan, P., Hui, S., Wollinger, W., Carvalho, L.J., Carvalho, L.J., Garrido, B.C., Rego, E.C.P., Ahn, S., Kim, B., Li, X., Guo, Z., Styarini, D., Aristiawan, Y., Ramadhaningtyas, D.P., Aryana, N., Ebarvia, B.S., Goren, A.C., Gunduz, S., Yilmaz, H. "APMP.QM-S8 : Determination of Mass Fraction of Benzoic Acid, Methyl Paraben and N-Butyl Paraben in Soy Sauce", Metrologia, 54:Technical Supplement (2017) : 1-72

58. Ricci, M., Shegunova, P., Conneely, P., Becker, R., Torres, M.M., Osuna, M.A., On, T.P., Man, L.H., Baek, S., Kim, B., Hopley, C., Liscio, C., Warren, J., Diouron, V.L., Lardy-Fontan, S., Lalere, B., Mingwu, S., Kucklick, J., Vamathevan, V., Matsuyama, S., Numata, M., Brits, M., Goren, A.C., Binici, B. "CCQM-K102 Polybrominated Diphenyl Ethers in Sediment", Metrologia, 54:Technical Supplement (2017) : 1-82

59. Elahi, P., Kalaycioglu, H., Akcaalan, O., Senel, C., Ilday, F.O. "Burst-Mode Thulium All-Fiber Laser Delivering Femtosecond Pulses at a 1 GHz Intra-Burst Repetition Rate", Optics Letters, 42:19 (2017) : 3808-3811

60. Demir, D.A., Karahan, C., Korutlu, B., Sargin, O., Sargin, o., Demir, D.A. "Hidden Spin-3/2 Field in the Standard Model", The European Physical Journal C, 77:9 (2017) : 593

61. Baykal, A., Unver, I., Topal, U., Sozeri, H. "Pb Substituted Ba,Sr-Hexaferrite Nanoparticles as High Quality Microwave Absorbers ", Ceramics International , 43:16 (2017) : 14023-14030

62. Ornek, O., Alpaslan Kosemen, Z., Ozturk, S., Canimkubey, B., Findik, S., Erkovan, M., Kosemen, A. "Performance Enhancement of Inverted Type Organic Solar Cells by Using Eu Doped TiO2 Thin Film", Surfaces and Interfaces, 9:December (2017) : 64-69

63. Baykal, A., Gunes, H., Sozeri, H., Amir, M., Auwal, I., Asiri, S., Shirsath, S., Demir Korkmaz, A. "Magnetic Properties and Mössbauer Spectroscopy of Cu-Mn Substituted BaFe12O19 Hexaferrites ", Ceramics International , 43:17 (2017) : 15486-15492

64. Bilgic, E., Mutaf, H., Kirbas, C., Sadikoglu, E. "Evaluation of Uncertainty Contributions of Measurement Surface and Number of Microphone Positions in Determination of Sound Power Levels", Acta Physica Polonica A, 132:3 (2017) : 642-649

65. Hatipoglu, S.D., Yalcinkaya, B., Akgoz, M., Ozturk, T., Goren, A.C., Topcu, G. "Screening of Hallucinogenic Compounds and Genomic Characterisation of 40 Anatolian Salvia Species", Phytochemical Analysis, 28:6 (2017) : 541-549

66. Bilgic, E. "Determination of Pulse Width and Pulse Amplitude Characteristics of Materials Used in Pendulum Type Shock Calibration Device", Acta Physica Polonica A, 132:3 (2017) : 857-860

67. Sametoglu, F., Celikel, O., Witt, F. "A Differential Spectral Responsivity Measurement System Constructed for Determining of the Spectral Responsivity of a Single- and Triple-Junction Photovoltaic Cells", The European Physical Journal Applied Physics, 80:2 (2017) : 21001 (p1-p10)

68. Uytun, A., Kalemci, M. "First Interlaboratory Comparison on Calibration of Temperature-Controlled Enclosures in Turkey", International Journal of Thermophysics, 38:11 (2017) : 168-178

69. Isleyen, A. "Certified Reference Material Production in Turkey", Journal of Chemical Metrology, 11:2 (2017) : 86-88

70. Deniz, N., Liv, L., Nakiboglu, N. "Determination and Validation Method of Molybdenum by Adsorptive Catalytic Stripping Voltammetry at Lead Film Electrode", Journal of Chemical Metrology, 11:2 (2017) : 46-54

71. Synthesis of Novel Meso-Indole- and Meso-Triazatruxene-BODIPY DyesMutaf, H., Kirbas, C., Sadikoglu, E. "Evaluation of Uncertainty Contributions of Measurement Surface and Number of Microphone Positions in Determination of Sound Power Levels", Acta Physica Polonica A, 132:3 (2017) : 642-649

72. Uytun, A., Kalemci, M. "First Interlaboratory Comparison on Calibration of Temperature-Controlled Enclosures in Turkey", International Journal of Thermophysics, 38:11 (2017) : 1-10

73. Yandayan, T. "Recent Developments in Nano-Radian Angle Metrology", Proceedings of SPIE - The International Society for Optical Engineering, 10385:- (2017) : 1038509

74. Yandayan, T. "A Portable Device for Calibration of Autocoıllimators with Nanoradian Precision", Proceedings of SPIE - The International Society for Optical Engineering, 10385:- (2017) : 1038509

75. Gokcen, T., Bilsel, G., Tarhan, T., Un, I., Goren, A.C., Van Der Veen, A. "Validation and Sensitivity Evaluation of the ID-GC-TOF-MS Method for Determination of PAHs in Biogas", Journal of Chemical Metrology, 11:2 (2017) : 78-85

76. Baykal, A., Eryigit, S., Amir, M., Gungunes, H., Sozeri, H., Shirsath, S.E., Sertkol, M., Sairi, S. "Magnetic Properties and Cation Distribution of Bimetallic (Mn–Co) Doped NiFe2O4 Nanoparticles", Journal of Inorganic and Organometallic Polymers and Materials, 27:6 (2017) : 1893–1900

77. Akkus Ozen, S., Yaman, M. "Fractionation of Cd & Pb in Agricultural Soil & Their Determinations Using Inductively Coupled Plasma-Optical Emission Spectrometry", Fresenius Environmental Bulletin, 26:7 (2017) : 4338-4344

78. Asicioglu, M., Yalcinkaya, B., Akgoz, M. "Measurement of Genetically Modified (GM) Genes in Different Corn Products", Journal of Chemical Metrology, 11:2 (2017) : 55-60

79. Atay, Balkan, I., Goren, A.C., Kirmizibekmez, H., Yesilada, E. "Evaluation of the in Vitro Anti-Inflammatory Activity of Nerium Oleander L. Flower Extracts and Activity-Guided Isolation of the Active Constituents", Records of Natural Products, 12:2 (2017) : 128-141

80. Ozkok, E., Can, H., Inanir, F., Topal, U. "A Comparative Study for Optimization of Sensitivity and Noise Levels in Race-Track Sensors ", Journal of Superconductivity and Novel Magnetism, 30:12 (2017) : 3555-3557

81. Can, H., Svec, P., Bydzovsky, J., Svec, S., Aktas, B., Sozeri, H., Topal, U. "Fabrication of Fluxgate Sensor Heads by Milling with a Circuit Board Plotter and Influence of Core Annealing Conditions on Sensor Performance ", Journal of Superconductivity and Novel Magnetism, 30:11 (2017) : 3257-3261

82. Eroglu, M.S., Bostan, M.S. "GAP Pre-Polymer, as an Energetic Binder and High Performance Additive for Propellants and Explosives: A Review ", Organic Communications, 10:3 (2017) : 135-143

83. Fidan, E., Kucur, O. "SSER Analysis of AF MIMO TWRNs with Single and Multiple Antenna Selection Schemes ", 25th Signal Processing and Communications Applications Conference, 15-18 Mayıs:Antalya (2017) : 4

Chapter author in book: "Inspection of Medical Devices-for Regulatory Purposes", Almir Badnjević, Mario Cifrek, Ratko Magjarević, Zijad Džemić. (ed)., Karaböce, Baki "Inspection and Testing of Respirators and Anaesthesia Machines", Singapore : Springer (2017), 181-201. (Chapter 8).(ISBN 978-981-10-6650-4)

International Conference Papers

41 international conference papers were published in 2017.

1- Nieuwenkamp, G., Zalewska, E., Pearce-Hill, R., Brewer, P., Resner, K., Mace, T., Tarhan, T., Zellweger, C., Mohn, J. "High Accuracy Primary Reference Gas Mixtures for High-Impact Greenhouse Gases", European Geosciences Union General Assembly , Viyana (23-28/04/2017) : 1 p.

2- Zellweger, C., Mohn, J., Wyss, S., Brewer, P., Mace, T., Nieuwenkamp, G., Pearce-Hill, R., Tarhan, T., Walden, J., Emmenegger, L. "Calibration Standards for Greenhouse Gases and Carbon Monoxide: Status and Challenges.", European Geosciences Union General Assembly , Viyana (23-28/04/2017) : 1 p.

3- Karaboce, B., Durmus, H.O., Cetin, E., Ozdingis, M. "Calibration of Therapeutic Ultrasonic Transducers with the Modified Radiation Force Balance System", IEEE International Symposium on Medical Measurements and Applications (MeMeA), Minnesota (07-10/05/2017) : 5 p.

4- Karaboce, B., Cetin, E., Durmus, H.O., Ozdingis, M., Korkmaz, H., Altun, J., Argun, S. "Experimental Investigations of Viscous Heating Effect of Thermocouples under Focused Ultrasound Applications", IEEE International Symposium on Medical Measurements and Applications (MeMeA) , Minnesota (07-10/05/2017) : 6 p.

5- Bilgic, E., N. Alsubaey, F., A. Aladhyani, I., Sadikoglu, E., Kirbas, C. "Current Situations on Vibration Field at NMCC and Calibration of Signal Conditioner ", IMEKO 23rd TC3, 13th TC5 and 4th TC22 International Conference, Helsinki (30/05-01/06/2017) : 4 p.

6- Yelekci, S., Yilmaz, C., Kacmaz, S., Telli, M. "Calibration of Automatic Gravimetric Filling Instruments in Dynamic Weighing", IMEKO 23rd TC3, 13th TC5 and 4th TC22 International Conference, Helsinki (30/05-01/06/2017) : 4 p.

7- Alghamdi, M., Alyousefi, R., Alqarni, S., Aljuwayr, A., Kacmaz, S. "Air Density Determination by Using Buoyancy Artefacts at SASO NMCC", IMEKO 23rd TC3, 13th TC5 and 4th TC22 International Conference, Helsinki (30/05-01/06/2017) : 4 p.

8- Isleyen, A. "Certified Reference Materials-CRMs", GCC Standardization Organization of the Cooperation Council for the Arab States of the Gulf , (08-10/05/2017), Muscat (Presentation)

9- Elkatmis, A. "Remarks Concerning about the Characteristics of the Extractor Vacuum Gauge and the Quadrupole Mass Spectrometer ", 6th CCM PV International Conference on Pressure and Vacuum Metrology, (07-10/05/2017), Pereira (Presentation)

10- Elkatmis, A. "Time Stability Characterization of Quadrupole Mass Spectrometers", 6th CCM PV International Conference on Pressure and Vacuum Metrology, (07-10/05/2017), Pereira(Presentation)

11- Dizdar, H., Aydemir, B., Vatan, C. "Importance of Force Measurements and Their Traceability in Steel Industry", 3rd Iron and Steel Symposium (UDCS'17) , Karabük (03-05/04/2017) : 4 p.

12- Aydemir, B. "The Changes in ISO 6892-1:2016 Metallic Materials Tensile Testing Standard", 3rd Iron and Steel Symposium (UDCS'17) , Karabük (03-05/04/2017) : 4 p.

13- Kavruk, M., Aydemir, B. "Analysis of Accredited Laboratories in the Steel Sector in Turkey", 3rd Iron and Steel Symposium (UDCS'17), Karabük (03-05/04/2017) : 6 p.

14- Yandayan, T., Geckeler, R. "Demands for Nanoradian Angle Metrology and Performance Requirements on Autocollimators", Euspen's 17th International Conference & Exhibition, Hannover (29/05-02/06/2017) : 2 p.

15- Yandayan, T. "A Portable Large Range Small Angle Generator (LRSAG) for Precise Calibration of Autocollimators ", Euspen's 17th International Conference & Exhibition, Hannover (29/05-03/06/2017) : 2 p.

16- Cakir, S., Aslan, C., Leferink, F. "Comparison of Test Standards for Immunity Testing in Reverberation Chambers", Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC), Seul (20-23/06/2017) : 3 p.

17- Sen, O., Cakir, S., Acak, S. "More Insight into Conducted Immunity Tests and Investigation of Support Influences", Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC), Seul (20-23/06/2017) : 3 p.

18- Sen, O., Cakir, S. "Loop Antenna Calibrations with Inclusion of Vector Network Analyser and Comparison Between Calibration Methods", International Symposium and Exhibition on Electromagnetic Compatibility (EMC Europe 2017), Angers (04-08/09/2017) : 5 p.

19- Dizdar, H., Aydemir, B., Vatan, C. "Importance of Force Measurements and Their Traceability in Steel Industry", 3rd International Iron & Steel Symposium (UDCS 17), Karabük (03-05/04/2017) : 4 p.

20- Tektas, C.B., Salhi, M., Sen, O., Cakir, S., Cetintas, M. "Alternative Magnetic Field Immunity Test by Using Large Loop Antenna", Fourth International EMC Conference, Ankara (24-27/09/2017) : 3 p.

21- Celep, M., Danaci, E., Sakarya, H. "Charazterization of BNC Calibration Standards", 18th Iinternational Metrology Congress (CIM 2017), Paris (19-21/09/2017) : 10 p.

22- Sakarya, H., Celep, M., Aljawan, A.H., Alboraih, I.M., Aldawood, K. "Bilateral Comparison on Transmission Coefficient Measurement Between TÜBİTAK UME and SASO NMCC", 18th Iinternational Metrology Congress (CIM 2017), Paris (19-21/09/2017) : 13 p.

23- Danaci, E., Celep, M., Sakarya, H., Tuncel, O., Aldawood, K.S., Alboraih, I.M., Aljawan, A.H. "Calibration Factor Comparison Between TÜBİTAK UME and SASO NMCC", 18th Iinternational Metrology Congress (CIM 2017), Paris (19-21/09/2017) : 17 p.

24- Isleyen, A., Can, S.Z., Cankur, O., Ari, B., Tunc, M., Binici, B., Gokcen, T., Cakilbahce, Z. "Three Candidate Certified Reference Materials for Environmental Analysis", 10th International Conference on Instrumental Methods of Analysis Modern Trends and Applications, Girit (17-21/09/2017) : 19 p.

25- Sadikoglu, E., Bilgic, E., Kirbas, C., Karaboce, B. "Short Report on AUV Activities at TÜBİTAK Ulusal Metroloji Enstitüsü (UME)", 11th CCAUV Meeting, BIPM, Paris (20-22/09/2017) : 8 p.

26- Sadikoglu, E. "New Regional Metrology Organization - GULFMET", 11th CCAUV Meeting, BIPM, (20-22/09/2017), Paris (Presentation)

27- Isleyen, A. "Reference Materials for Inspection Labs and Methods of Preparation, Use and Validation", GCC Standardization Training Center, (26-28/09/2017), Riyadh (Presentation)

28- Dizdar, H., Aydemir, B., Vatan, C. "Differences of Latest Versions of ISO 6892-1 and ASTM E8 Tensile Testing Standards", 2nd International Conference on Material Science and Technology in Cappadocia (IMSTEC'17), Nevşehir (11-13/10/2017) : 6 p.

29- Durgut, Y. "Metrological Characterization of Non-Rotating Low-Pressure Piston-Cylinder Unit System", 4th Internatıonal Conference On Computational and Experimental Science and Engineering (ICCESEN 2017), Antalya (04-08/10/2017) : 4 p.

30- Cetintas, M., Celik, M. "Displacement Measurements using FM Modulated Laser", Recent Developments in Traceable Dimensional Measurements (MacroScale 2017), Espoo (17-19/10/2017) : 2 p.

31- Aydemir, B., Tascan, H., Camyurdu, C., Baran, O., Temiz, A. "Investigation of Effects on the Results of Different Test Rates in Metallic", 2nd International Conference on Material Science and Technology in Cappadocia (IMSTEC'17), Nevşehir (11-13/10/2017) : 6 p.

32- Aydemir, B., Sahin, S., Sahin, T. "Effect of Particle Size of Calcium Carbonate on the Short-Term Tensile Creep Properties of Polypropylene Block Copolymer", 2nd International Conference on Material Science and Technology in Cappadocia (IMSTEC'17), Nevşehir (11-13/10/2017) : 4 p.

33- Fidan, E., Kucur, O. "Outage Performance of Two Way Full-Duplex Relay Networks with Antenna Selection", Advances in Wireless and Optical Communications (RTUWO), Riga (02-03/11/2017) : 5 p.

34- Telli, G.M., Aydemir, B. "Fotovolta,k Panellerde Tangın Testleri ve Önemi", 2nd International Mediterranean Science and Engineering Congress (IMSEC 2017), Adana (25-27/10/2017) : 7 p.

35- Yandayan, T., Geckeler, R., Just, A., Krause, M., Akgoz, S.A., Aksulu, M., Grubert, B., Watanabe, T. "Investigation of Interpolation Errors", Recent Developments in Traceable Dimensional Measurements (MacroScale 2017), Helsinki (17-19/10/2017) : 1 p.

36- Sadikoglu, E. "EURAMET TC-Q Structure, Operation and Internal Communication", EURAMET-BIPM Training on Review of Quality Management Systems, (07-08/11/2017), Madrid (Presentation)

37- Sadikoglu, E. "EURAMET TC-Q Review Process – an Overview ", EURAMET-BIPM Training on Review of Quality Management Systems, (07-08/11/2017), Madrid (Presentation)

38- Sadikoglu, E. "Quality Management System Review Procedure", EURAMET-BIPM Training on Review of Quality Management Systems, (07-08/11/2017), Madrid (Presentation)

39- Sadikoglu, E., Hoffmanova, S. "Peer Visits as a Part of QMS Review: EURAMET Expectations - (Minimum Requirements, Including Requirements for Peer Review Assessors)", EURAMET-BIPM Training on Review of Quality Management Systems, (07-08/11/2017), Madrid (Presentation)

40- Sadikoglu, E. "Peer Visits as a Part of QMS Review - Introduction ", EURAMET-BIPM Training on Review of Quality Management Systems, (07-08/11/2017), Madrid (Presentation)

41- Yalcinkaya, B., Akyurek, S., Oztug, M., Aktas, G., Altuntas, H., Isleyen, A., Akgoz, M. "Reference Material Production for Halal Food Analysis in Meat Product's", 4th International Halal and Healthy Food Congress, Ankara (03-05/11/2017) : 1 p.

National Publications

27 national publications were published in 2017.

1- Aydemir, B. "ISO 6892-1:2016 Metalik Malzemeler Çekme Deneyi Standardınaki Değişiklikler ve Etkileri", Metal Dünyası, Ocak :283 (2017) : 68-72

2- Goren, A.C., Un, I., Gunduz, S. "İlaç Sanayi, İlaç İzleme ve Tıbbi Cihazlar için İzlenebilir Ölçümler ve Referans Malzemelerin Önemi ", 5. İlaç Kimyası: İlaç Etkin Maddesi Tasarımı, Sentezi, Üretimi ve Standardizasyonu Kongresi, Antalya (30/03-02/04/2017) : 1 s.

3- Yilmaz, H., Gunduz, S., Goren, A.C. "Balık Yağında EPA ve DHA Miktarlarının Belirlenmesi", 5. İlaç Kimyası: İlaç Etkin Maddesi Tasarımı, Sentezi, Üretimi ve Standardizasyonu Kongresi, Antalya (30/03-02/04/2017) : 1 s.

4- Un, I., Goren, A.C. "Kantitatif NMR (qNMR) Analizleri ile Folik Asit Miktar Tayini", 5. İlaç Kimyası: İlaç Etkin Maddesi Tasarımı, Sentezi, Üretimi ve Standardizasyonu Kongresi, Antalya 30/03-02/04/2017) (Presentation)

5- Fidan, E., Kucur, O. "Tekli ve Çoklu Anten Seçimli Çift Yönlü AF MIMO Röleli Ağların SSER Analizi", 25. Sinyal İşleme ve İletişim Uygulamaları Kurultayı, Antalya (15-18/05/2017) : 4 s.

6- Karaboce, B. "Sağlık için Metroloji", Medikal Teknik, -:Mayıs (2017) : 28-30 (Popular publication)

7- *Liv, L. "Voltametrik Bor Tayini İçin Yeni Modifiye Elektrotların Hazırlanması, Karakterizasyonu ve Analitik Uygulamaları", (Doktora Tezi), Balıkesir Üniversitesi, (2017) : 340 s. Tez Danışman(lar)ı : Prof. Dr. Nuri NAKİBOĞLU

8- Karaboce, B., Cetin, E., Durmus, H.O. "Yüksek Yoğunluklu Odaklanmış Ultrasonun Termal Etkileri ", 28-29. Ulusal Biyofizik Kongresi, İstanbul (06-09/09/2017) : 2 s.

9- Isleyen, A., Can, S.Z., Cankur, O., Ari, B., Tunc, M., Binici, B., Gokcen, T. "Çevre Ölçümleri için Matriks Referans Malzemeler ", 29. Ulusal Kimya Kongresi, Ankara (10-14/09/2017) : 19 s.

10- Sadikoglu, E., Bilgic, E., Kirbas, C., Coskun, I. "İşitme Değerlendirmesinin Metroloji Temelinin Kuvvetlendirilmesi için Avrupa Birliğinde İşbirliği Örneği", 12. Ulusal Akustik Kongresi, İzmir (14-15/09/2017) : 7 s.

11- Bilgic, E., Sadikoglu, E., Kirbas, C., Coskun, I., Besiroglu, S. "Sensör ve Sinyal Şartlandırıcı Kalibrasyonları Akustik ve Titreşim Alanı Uygulamaları", 12. Ulusal Akustik Kongresi, İzmir (14-15/09/2017) : 9 s.

12- Kirbas, C., Bilgic, E., Sadikoglu, E. "Referans Ses Kaynaklarının Karakterizasyonu", 12. Ulusal Akustik Kongresi, İzmir (14-15/09/2017) : 9 s.

13- Saher, K., Nas, S., Karaboce, B., Kirbas, C., Bilgic, E. "Çınlanım Odasında Ölçüm ve Simülasyon Değerlerinin Karşılaştırılması", 12. Ulusal Akustik Kongresi, İzmir (14-15/09/2017) : 8 s.

14- Karaboce, B., Durmus, H.O., Cetin, E., Ozdingis, M. "Tedavide Kullanılan Ultrasonik Dönüştürücülerin Güç Kalibrasyonu", 12. Ulusal Akustik Kongresi, İzmir (14-15/09/2017) : 10 s.

15- Karaboce, B., Ozdingis, M., Durmus, H.O., Cetin, E. "Portatif Ultrasonik Güç Ölçer Sistemi", 12. Ulusal Akustik Kongresi, İzmir (14-15/09/2017) : 10 s.

16- Binici, B., Akyurek, S., Akcadag, U.Y., Sakarya, O., Isleyen, A., Goren, A.C. "Motorinde Çoklu Parametre Referans Malzeme Üretimi ve Sertifikalandırılması", 29. Ulusal Kimya Kongresi , Ankara (10-14/09/2017) : 235 s.

17- Aydemir, B., Basturk, A. "Kalibrasyon Laboratuvarlarında Denetim", TÜRKAK Denetçi Deneyim Paylaşım Toplantısı ve Yenilenme Eğitimi, İstanbul (15/09/2017) (Presentation)

18- Turhan, S. "Kalibrasyon Sertifikalarının Yorumlanması", TÜRKAK Denetçi Deneyim Paylaşım Toplantısı ve Yenilenme Eğitimi, İstanbul (15/09/2017) (Presentation)

19- Turhan, S. "Kalibrasyon Periyodunun Belirlenmesi", TÜRKAK Denetçi Deneyim Paylaşım Toplantısı ve Yenilenme Eğitimi, İstanbul (15/09/2017) (Presentation)

20- Akcadag, F. "Dış Kalite Kontrol Programlarının Sonuç Raporlarının TS EN ISO/IEC 17043 Yeterlilik Testleri için Genel Şartlar Standardına Uygunluğunun Kontrolü ve Yeni ISO 13528 'e Göre İstatistiksel Değerlendirilmelerde Getirilen Yenilikler", TÜRKAK Denetçi Deneyim Paylaşım Toplantısı ve Yenilenme Eğitimi, İstanbul (15/09/2017) (Presentation)

21- Karaboce, B., Cetin, E., Ozdingis, M., Durmus, H.O. "Doku Benzeri Fantom İçindeki Farklı Cisimlerin Görüntü Ölçüm Doğrulama Çalışmaları ", Tıp Teknolojileri Ulusal Kongresi (TIPTEKNO'17), Trabzon (12-14/10/2017) : 4 s.

22- Karaboce, B., Cetin, E., Durmus, H.O., Ozdingis, M. "HIFU Uygulamaları Altında Isılçiftlerin Viskoz Isıtma Etkisinin İncelenmesi ", Tıp Teknolojileri Ulusal Kongresi (TIPTEKNO'17), Trabzon (12-14/10/2017) : 4 s.

23- Yalcinkaya, B., Akyurek, S., Oztug, M., Aktas, G., Altuntas, H., Isleyen, A., Akgoz, M. "Et Tür Tayini İçin Referans Malzeme Üretimi ", VI. Ulusal Moleküler Biyoloji ve Biyoteknoloji Kongresi, Adana (05-07/10/2017) : 1 s.

24- Akkus Ozen, S., Dispinar, T., Akcadag, F., Celik, M., Dakak, R., Topal, K., Isleyen, A. "Fındıkta Aflatoksin için Referans Malzeme Üretimine Yönelik Ön Çalışmalar", 29. Ulusal Kimya Kongresi, Ankara (10-14/09/2017) : 1 s.

25- Akcadag, F. "Dış Kalite Kontrol Programlarının Sonuç Raporlarının TS EN ISO/IEC 17043 Yeterlilik Testleri için Genel Şartlar Standardına Uygunluğunun Kontrolü ve Yeni ISO 13528 'e Göre İstatistiksel Değerlendirilmelerde Getirilen Yenilikler", TÜRKAK Denetçi Deneyim Paylaşım Toplantısı ve Yenilenme Eğitimi, İstanbul (15/09/2017) (Sunum)

26- Yalcinkaya, B., Akyurek, S., Oztug, M., Aktas, G., Altuntas, H., Isleyen, A., Akgoz, M. "Reference Material Production For Meat Species Identification", 6. Ulusal Moleküler Biyoloji ve Biyoteknoloji Kongresi, Adana (05-07/10/2017) : 1 s.

27- Hatipoglu, S.D. "Bazı Salvia Türlerinin Sekonder Metobolitlerinin Analizi, Genomik Karakterizasyonu ve Biyolojik Aktivitelerinin İncelenmesi", (Doktora Tezi), İstanbul Teknik Üniversitesi, (2017) : 172 s. Tez Danışman(lar)ı: Prof Dr. Turan ÖZTÜRK, Prof. Dr. Gülaçtı TOPÇU

Technical Reports

28 technical reports were published in 2017.

1- Celep, M., Danaci, E., Tuncel, O. "Microcalorimeter Software Validation Report (2017-G1MD-R01)", Gebze : Ulusal Metroloji Enstitüsü RF ve Mikrodalga Laboratuvarı, 2017
2- Danaci, E., Celep, M. "Calculation of Power and Uncertainty of Power With Analog Powermeters (2017-G1MD-R02)", Gebze : Ulusal Metroloji Enstitüsü RF ve Mikrodalga Laboratuvarı, 2017
3- Danaci, E., Celep, M. "Mismatch and Uncertainty Calculation Report (2017-G1MD-R03)", Gebze : Ulusal Metroloji Enstitüsü RF ve Mikrodalga Laboratuvarı, 2017
4- Aydemir, B. "SASO NMCC–TÜBİTAK UME D-3.10 Kuvvet Projesi Final Raporu", Gebze: Ulusal Metroloji Enstitüsü, 2017
5- Aydemir, B. "SASO NMCC–TÜBİTAK UME D-3.10 Force Project Final Report", Gebze: Ulusal Metroloji Enstitüsü, 2017
6- Ayhan, B., Cayci, H. "Bilateral Comparison of Current Ratio Measurements Between TÜBİTAK UME and SASO NMCC DRAFT A" (2017) : 12 p.
7- Ayhan, B., Cayci, H. "Bilateral Comparison of Current Ratio Measurements Between TÜBİTAK UME and SASO NMCC FINAL REPORT" (2017) : 29 p.
8- Ayhan, B., Cayci, H. "Bilateral Comparison of Voltage Ratio Measurements Between TÜBİTAK UME and SASO NMCC DRAFT A " (2017) : 12 p.
9- Ayhan, B., Cayci, H. "Bilateral Comparison of Voltage Ratio Measurements Between TÜBİTAK UME and SASO NMCC Final Report " (2017) : 27 p.
10- Yilmaz, O., Cayci, H. "Bilateral Comparison of AC Power Standards Between TÜBİTAK UME and SASO NMCC DRAFT A" (2017) : 37 p.
11- Boztepe, A. "Sıvılaştırılmış Petrol Gazları (LPG) - Özellikler ve Deney Yöntemleri", Gebze: TÜBİTAK UME, 2017
12- Boztepe, A. "TS EN ISO 4257 Sıvılaştırılmış Petrol Gazları (LPG) Numune Alma Eğitimi", Gebze: TÜBİTAK UME, 2017

13- Dong, L., Sui, Z., Wang, J., Tang, V., Chum, W., Lee, F., Sin, D., Urquiza, P., Burns, M., Milavec, M., Prawettongsopon, C., Griffiths, K.R., Mclaughlin, J.L., Shibayama, S., Akyurek, S., Akgoz, M., Kunte, H.J. "CCQM-K86.b/P113.3 Relative Quantification of Bt63 in GM Rice Matrix Sample" (16/04/2015-18/04/2017) : 33 p.

14- Akyurek, S., Akgoz, M. "Biyolojik Dokudan Elde Edilen Genomik DNA Parçalarının Bağıl Miktar Tayini Metodunun Doğrulanması ve Belirsizlik Hesaplama Raporu (Rev. A)", Gebze: Ulusal Metroloji Enstitüsü, 2017

15- Tarhan, T. "Karbon Monoksit ve Karbon Dioksit Gazları için Primer Referans Gaz Karışımlarının Hazırlanması ve Sertifikasyonu, İç Proje Sonuç Raporu (G3GA-E1-01-I)", Gebze: Ulusal Metroloji Enstitüsü, 2017

16- Elkatmis, A. "Statik Genleşme Sistemi Titreşim Testi Ölçüm Raporu", Gebze: TÜBİTAK UME Vakum Laboratuvarı, 2017

17- Aslan, C., Alrobaish, A.M., Sen, O. "Bilateral Comparison on Electric Field Measurements Between TÜBİTAK UME and SASO NMCC" (2017) : 41 p.

18- Isleyen, A. "Referans Malzemeler ve Kullanımı", Gebze: TÜBİTAK UME, 2017

19- Aydemir, B., Vatan, C., Dizdar, H., Binown, A. "Dfart a Report Bilateral Comparison on Force Standard Machines Between TUBITAK UME and SASO NMCC -GULFMET.M.F-S2" (2017) : 23 p.

20- Aydemir, B., Vatan, C., Dizdar, H., Binown, A. "Final Report Bilateral Comparison on Force Standard Machines Between TUBITAK UME and SASO NMCC -GULFMET.M.F-S2" (2017) : 25 p.

21- Aydemir, B., Vatan, C., Dizdar, H. "GULFMET--M-F-S1 Technical Protokol Comparison of Force Standard Machines" (2018) : 15 p

22- Uysal, E., Boztepe, A., Gulsoy, K.Z., Altin Yilmazer, G. "ISO Guide 34 ve ISO 17034 : 2016 Karşılaştırılması", Gebze : Ulusal Metroloji Enstitüsü, 2017

23- Erkan, O., Hayirli, C. "Wheatstone Bridge Software Validation Report (2017-G1EP-R01)", Gebze : TÜBİTAK UME Empedans Laboratuvarı, 2017

24- Isleyen, A. "ISO 17034 Referans Malzeme Üreticilerinin Yetkinliği için Teknik Gereklilikler", Ankara: Ulusal Metroloji Enstitüsü, 2017 (Eğitim Dokümanı)

25- Bilgic, E. "Çalışma Standardı Mikrofonların Karşılaştırma Yöntemi ile Serbest Alan Tepkisinin Belirlenmesi Fizibilite Çalışması (2017-G2AK-001)", Gebze: Ulusal Metroloji Enstitüsü, 2017

26- Sadikoglu, E. "Report on the Peer Review of Calibration Capabilities of the NSAI National Metrology Laboratory in Acoustics Field ", Gebze : Ulusal Metroloji Enstitüsü, 2017
27- Kefeli, T., Cayci, H. "Technical Report: Flicker Software Validation Report", Gebze : Ulusal Metroloji Enstitüsü Güç ve Enerji Laboratuvarı, 2017
28- Can, S.Z., Ari, B., Cankur, O., Coskun, F.G., Cakilbahce, Z., Isleyen, A., Tunc, M. "Kolemanit Sertifikalı Referans Malzemesi Sertifikalandırma Raporu", Gebze : Ulusal Metroloji Enstitüsü, 2017

Patents

TÜBİTAK UME submitted 2 patent applications in 2017.

1. Nükleaz Enzimlerini Üreten Mikroorganizmaların Hızlı Tanısı için Yöntem (Erkan Mozioğlu, Sema Akyürek, Simay Gündüz, Müslüm Akgöz, Ahmet Ceyhan Gören, Zühtü Tanıl Kocagöz,)
2. Hava Araçları için Hız ve İrtifa Bilgilerinin Elde Edilmesini Sağlayan Bir Pitot Tüp (Bülent ÜNSAL, Esra KOÇ)

Additionally, TÜBİTAK UME submitted 2 internatonal patent applications by using the subscription rights of national patent applications.

1. International patent application PCT/IB2017/058276 was submitted based on national patent application TR 2016/19943 (R.KANGI) on 21/12/2017 with the title "High accuracy pressure transducer with improved temperature stability"
2. International patent application PCT/IB2017/058280 was submitted based on national patenet application TR 2016/20326 (H.Çaycı, K.Gülnihar, T.Kefeli) with the title "Frequency adaptive harmonic current generator".

GLOSSARY

Metrology(*)

Science of measurement and its application

Measurement(*)

Process of experimentally obtaining one or more quantity values that can reasonably be attributed to a quantity

Measurement Accuracy(*)

Closeness of agreement between a measured quantity value and a true quantity value of a measurand

Calibration(*)

Operation that, under specified conditions, in a first step, establishes a relation between the quantity values with measurement uncertainties provided by measurement standards and corresponding indications with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a measurement result from an indication.

Measurement Uncertainty(*)

Non-negative parameter characterizing the dispersion of the quantity values being attributed to a measurand, based on the information used

Primary Measurement Standard(*)

Measurement standard established using a primary reference measurement pocedure, or created as an artifact

Metrological Traceability(*)

Property of a measurement whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty

Accreditation

Evaluation and confirmation of proficiency of Conformity Assesment Organizations by an accepted system through taken into account designated standards

Calibration Certificate

A document produced at the end of a calibration, containing information on the measurement standards and reference instruments used, the calibration method and procedure, enviromental conditions, measurement results and uncertainties and which establishes traceability to the national measurement standards that realize SI units

(*) International vocabulary of metrology – Basic and general concepts and associated terms (BIPM, 2008, 3rd edition)

CONTACT US

Postal Address
TÜBİTAK Ulusal Metroloji Enstitüsü
TÜBİTAK Gebze Yerleşkesi
Barış Mah. Dr. Zeki Acar Cad. No:1
41470 Gebze/KOCAELİ

Tel: 0 (262) 679 50 00
Fax: 0 (262) 679 50 01
E-mail: ume@tubitak.gov.tr
Website: www.ume.tubitak.gov.tr

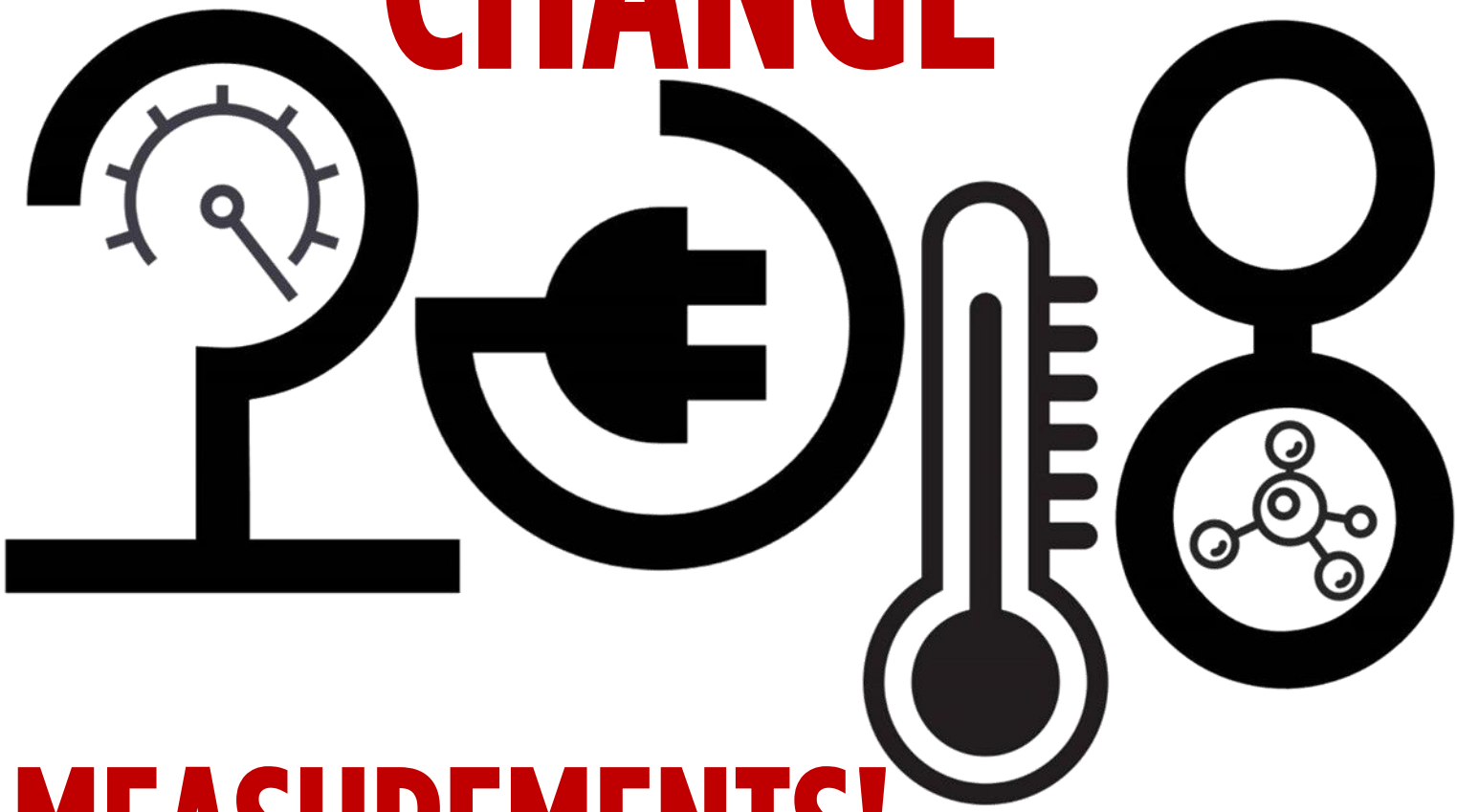
Editorial Team

Publication Manager
Dr. Mustafa ÇETİNTAŞ
Writers
Tamer TEZEL
Uğur AKKAYA
Design and Photos
Uğur AKKAYA
Translation
Ahmet Ömer ALTAN
Müge ATAM

TÜBİTAK

UME

CHANGE THROUGH



MEASUREMENTS!

TRUE
MEASUREMENT
EXCELLENCE