Fuel cells convert chemical energy present in a fuel to electrical power. Solid oxide fuel cells convert gaseous fuels in a highly efficient and environmentally friendly process. Italy-based SOLIDpower uses METTLER TOLEDO’s balances and LabX® laboratory software in its quality control procedures ensuring the optimum performance of their fuel cells.

Simplified Quality Control Ensures Fuel Cell Performance

Such gas-fired fuel cells can be run on green raw materials, such as methane or gasified biomass and waste materials. The conversion of the incoming gas to electricity and heat is a staggering 90% efficient when compared to a traditional power station which loses 70% of the energy produced when fossil fuels are burned. SOLIDpower presents a vision in which solid oxide fuel cells (SOFC) are widely employed in houses, businesses, industry and even vehicles, dramatically reducing global carbon dioxide and other harmful emissions such as nitrogen and sulfur oxides and particulate matters.

Complex manufacturing process

The basis of SOFCs is the central electrolyte layer, which is typically based on zirconium or cerium oxides. The anode and cathode are applied individually to opposite sides of the electrolyte by spraying a secret formulation of metallic catalysts onto the electrolyte and heat-treating at a high temperature. A final layer is ‘screen-printed’ onto the cell to provide an electrical contact between the cells. The cells require temperatures of 650-800°C to operate. Charged oxygen atoms in the air at the anode travel uni-directionally across the electrolyte where they react with hydrogen in the fuel gas at the cathode to produce H₂O. The free electrons are streamed off as usable power. Stacks of the cells are combined to produce units that generate sufficient power to be used in everyday applications.

The paperwork challenge

This manufacturing process applied by...
SOLIDpower, a relatively young enterprise with over 60 employees and facilities in Italy and Switzerland, is delicate. Thus, quality control is critical to the performance of their SOFCs. In a procedure carried out many times each day, the cells are weighed before and after the addition of each layer to quantify the correct amount of material. Laboratory personnel got bogged down with the amount of manual recording and calculations involved in this process and contacted METTLER TOLEDO for advice.

**Simple solution**

An XP802S precision balance, in combination with LabX laboratory software, proved to be the perfect solution to their paperwork problems. In their differential weighing application, LabX automatically records the ‘before and after’ weight values against unique sample IDs. All results are saved securely and all calculations are carried out automatically. Manual transcription has been completely eliminated and full traceability is ensured. In addition, by using an Ethernet interface on the balance, results are transferred to a PC outside the manufacturing cleanroom.

Text: Mauro Bondesan
Sales Manager Italy

▶ [www.mt.com/labx](http://www.mt.com/labx)
pH measurement accuracy strongly depends on factors, such as the pH sensor, the calibration procedure and even user handling. The sensor, which is the core piece of the whole measurement system, decreases in performance level over time and this directly influences result accuracy. Furthermore, events, such as a new installation or setup change involve risks. It is, therefore, crucial to verify the performance of a pH system on a regular basis in order to maintain measurement accuracy.

**Performance verification on a professional basis**
The VPac pH verification kit is an easy way to verify the performance of a pH measuring system. The kit contains two test solutions of unknown pH value (one acidic and one alkaline) together with instructions for preparing the pH system and measuring the solutions. The measured values are entered onto an online verification page for immediate evaluation. Simply download a conformity certificate to confirm the suitability of the tested pH system. If the system fails, non-conformity information containing clear trouble-shooting instructions is provided.

The VPac can be used for any pH system and provides easy and unbiased performance verification. Traceable solutions and a certificate (Figure 1) provide documentation for your audit trail.

Text: Angela Stuetz  
PH Lab Product Manager

www.mt.com/pH-vPac
No Surprises with Molding
Simple Routine QC of Polymers

Key quality parameters of incoming polymers for plastic molding, such as the melting or solidification behavior, are best assessed through material characterization. The new DSC 3 ensures accurate material insights through simple routine operation.

Typically, the quality of incoming materials for plastic molding can only be assessed by measuring the melt flow index (MFI). This method does not identify the material or characterize the melting and solidification behavior, which are important for the quality of molded parts. Differential Scanning Calorimetry (DSC) is the ideal method for the quality control of materials used in plastic molding.

Simple routine operation thanks to seamless workflows
Operators with little experience interpreting DSC measurements are often in charge of the routine quality control of incoming goods. Simple and intuitive operation is therefore essential to ensure reliable results. The new DSC 3 from METTLER TOLEDO offers seamless workflows with minimal user interaction. The operator can start predefined routine methods directly from the instruments' touchscreen display with OneClick™. The 34-position sample robot, with single axis movement, handles crucibles of different size and volume allowing continuous operation around the clock.

Automatic gas delivery and switching
The built-in mass flow controller (MFC) gas supply units guarantee the optimal atmosphere around the sample even where the chosen experiment requires the flow of a specific reactive gas or even gas switching during the measurement.

Auto-evaluation of DSC curves
Automatic evaluations based on defined conformity limits can be pre-programmed. For comparison purposes, pre-recorded DSC curves of good materials can be displayed at any time.

Figure 1: Distinction of original POM homopolymer and original POM copolymer samples with melting curves

Figure 2: Oxidation Onset Time measurement of the same polymer samples with different stabilizer content
Insights into the molecular structure of polymers

DSC 3 can distinguish between variations within a class of polymers. This is illustrated in Figure 1, which shows the melting behavior of a POM (polyoxymethylene) homopolymer and a POM copolymer. While the molecules of the homopolymer consist of just one type of monomer, the molecules of the copolymer contain multiple different monomers. These differences in molecular structure influence the melting behavior in the materials. In this particular case, the melting temperature of the copolymer is about 10 K lower than that of the homopolymer thus leading to a completely different behavior when molded.

The effect of thermostabilizers in polymers

Raw polymers are stabilized to prevent thermal and oxidative aging. The DSC method, measures the sample in an oxidative atmosphere assesses the effect of the stabilizer. Figure 2 shows the behavior of four polypropylene (PP) samples containing different concentrations of thermostabilizers. The decomposition of the PP sample without stabilizer begins immediately after melting. A stabilizer content of 2% or more ensures that the molding material is adequately stabilized against aging.

Text: Matthias Wagner,
Thermal Analysis Product Manager

www.mt.com/dsc
Efficient and Error-Free Titration Workflows

Manually recording titration sample weight and ID can be a laborious and error-prone task. By using the SmartSample™ workflow, data transfer from the balance to the titrator is automated, preventing errors and saving valuable time. Even method selection can be automated based on the data stored on RFID tags.

Weighing titration samples in electroplating labs can be time-consuming and error-prone if each sample weight and ID is entered manually into a journal or onto a sample beaker and then into the titrator.

The new SmartSample system improves this workflow by automatically transferring sample data from the balance to the titrator using a RFID tag attached to the titration beaker. Sample ID and weight are stored on the tag, which can be attached directly to the beaker or to a removable sleeve.

Automated data transfer

Once all the sample information is entered into the METTLER TOLEDO XPE205 analytical balance with RFID option, OneClick® functionality on the balance writes the sample data, including weight, directly onto the tag. Entry fields can be edited to store specific information: Bath, batch and weight, etc. ID numbers can even be increased automatically for sequenced samples, e.g. 123, 124, 125 etc.

The information only needs to be recorded once.

The beaker is then placed onto an InMotion™ Autosampler fitted with a RFID reader and the analysis started. The sample ID and weight are read automatically from the tag and used to calculate the results. Manual data entry is eliminated saving valuable time on each sample.

Multiple methods with LabX® SmartCodes

If multiple methods, such as copper, nickel or acid determination, are required on different samples, method selection can be fully automated using new LabX SmartCodes. SmartCodes, a functionality in our LabX PC laboratory software, automatically selects the appropriate method for a sample based on data stored on the RFID tag.

Once the sample and method IDs are defined, samples can be placed anywhere on the InMotion sample rack. The titrator identifies and performs the correct analysis with no transcription or sample order errors.

In this way, there is no need to define the number of samples in advance and the
Sample is automatically analyzed using the data on the RFID on the InMotion sample changer

Smart Tags can be attached to the beaker via a sleeve

Smart Tag attached directly to the sample beaker

measurement of ‘last-minute’ samples is also possible. The InMotion autosampler rack can be filled with different samples requiring different methods and the entire analysis is started with only One Click on the titrator.

With SmartSample, manual data transcription errors and sample mix-ups are prevented. Sample IDs and weights cannot be confused during transfer to the titrator, thus, no sample series has to be repeated. The sample data always stays with the sample ensuring full traceability throughout the sample preparation and analysis, providing high workflow security.

Text: Thomas Hitz,
Titration Applications Specialist

► www.mt.com/SmartSample

T90 Excellence Titrator
Speed Up Your UV/VIS Measurements
Accurate Results within Seconds

The new series of UV/VIS spectrophotometers from METTLER TOLEDO combines state-of-the-art optical technology with intuitive One Click™ user interface in a compact design to deliver accurate results within seconds. It is the ideal partner for optimizing your spectroscopic workflows and data management tasks to meet regulatory guidelines.

**Increased efficiency**
FastTrack™ technology enables instant instrument readiness and full spectrum scans within a second without jeopardizing accuracy.

**Reliable results**
FastTrack™ technology has been designed to meet your expectations regarding instrument performance. Be at ease that you get results you can trust.

**Simple operation**
Easy to learn and customizable to each user’s needs – the intuitive user interface guides you step by step and lets you start applications with only OneClick™.
**Automated performance verification**
Compliance with regulations has never been easier. CertiRef™ automatically verifies all performance parameters and generates a comprehensive report.

**Methods library**
Pre-defined METTLER TOLEDO methods are available and ready for use, or for adaptation to your specific application needs.

**Plug & Play accessories**
Select the right accessory for every application, from various sample holders to automation devices for increased operation performance.

**Connectivity with LabX®**
Combine all analytical instruments from METTLER TOLEDO with a single powerful PC software, which allows full data and workflow management.

**ABC of UV/VIS Spectroscopy Guide**
A comprehensive 360° overview about UV/VIS theory, instrument technology and industry segment specific applications. A valuable guide to enlighten your view on UV/VIS spectroscopy.

> [www.mt.com/sn-uvvis](http://www.mt.com/sn-uvvis)
Simultaneous Thermal Analyzer for Unparalleled Performance

The TGA/DSC 3+ provides trustworthy results using a TGA balance with position-independent weighing, automatic internal calibration weights, a wide measurement range and the best minimum weight performance. A complementary DSC heat flow sensor simultaneously measures heat flow in addition to weight changes; these two techniques provide insights into the composition of the analyzed materials.

**Outstanding weighing performance**
No other TGA can measure up to 50 million resolution points continuously with weight changes of a 5-gram sample are determined to 0.1 µg.

**Wide temperature range**
Analyze a broad variety of samples materials up to a temperature of 1600 °C.

**Detect thermal effects simultaneously**
A complementary DSC heat flow sensor simultaneously detects thermal events and precise transition temperatures, delivering insight into material behavior.

> www.mt.com/tga-dsc
Trusted Results at Your Fingertips
Worry-free Weighing

With customers demanding short lead times and reliable delivery dates, a trustworthy balance that is simple and easy to use is essential for accurate results. The robust MS-TS balances incorporate advanced security features to consistently deliver reliable results. An intuitive touchscreen with graphical user interface and more than 10 built-in applications makes daily weighing tasks simple even for untrained operators.

Always meet process tolerances
The MinWeigh function puts a red warning onto the screen. The digits remain red until the net sample weight lies above the pre-programmed minimum value.

Easy to operate display
The 7” extra-large, color, TFT touchscreen display is operable with cotton, silicon and rubber gloves. An intuitive user interface and 18mm digits makes routine tasks more comfortable.

Extended balance lifetime
The full die-cast aluminum housing not only protects the weighing cell from environmental influences and impacts, but also remains resistant to harsh chemicals, including acetone.

www.mt.com/balances
Effective Right Away
with METTLER TOLEDO Service

Take the stress-free route to instantly meet your productivity, quality and regulatory requirements. Rely on METTLER TOLEDO’s trained experts when it comes to professional installation and operator instructions.

METTLER TOLEDO Service offers competence and expertise in the following four areas:

**Installation Pats**
- Professional installation and configuration
- User familiarization
- Equipment qualification

**Calibration and Certificates**
- Easily understandable and audit-proof certificates
- Internationally approved procedures
- Selected according to your requirements

**User Training**
- Tailored to your needs
- Trained by the expert of the manufacturer

**Extended Care**
- Extended warranty
- Preventive maintenance
- Priority technical assistance

[www.mt.com/service](http://www.mt.com/service)