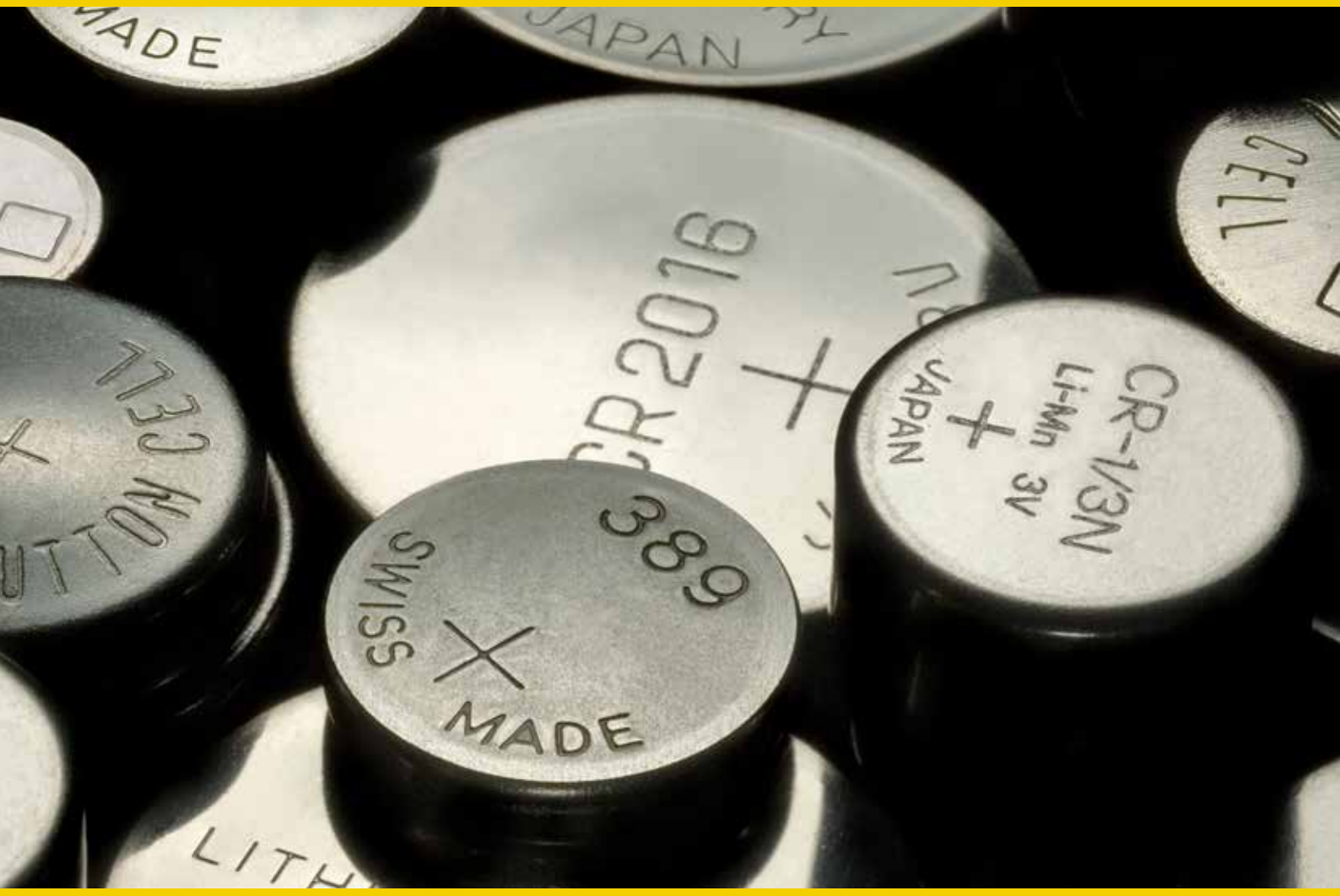
European Metrology Research Programme

Delivering Impact

EURAMET



Energy harvesting for greener transport

Transport is responsible for around a quarter of Europe's greenhouse gas emissions, and is the only major sector where emissions are still rising. Cleaner, more efficient vehicles are needed to help Europe reduce emissions and prevent dangerous climate change.

Europe's National Measurement Institutes working together

The European Metrology Research Programme (EMRP) brings together National Measurement Institutes in 23 countries to address key measurement challenges at a European level. It supports collaborative research to ensure that measurement science meets the future needs of industry and wider society.

Challenge

Harvesting waste heat from vehicles could reduce fuel consumption and CO_2 emissions. Most major automotive companies are currently developing thermoelectric generators, which capture waste heat from a car's exhaust and turn it into electricity. This harvested energy can be used to power a car's electrical system, reducing the load on the engine and cutting both fuel consumption and emissions.

To encourage mass-market adoption of the technology, new thermoelectric materials - which turn heat into electricity - are needed to create smaller, cheaper, more efficient thermoelectric generators. Developers need accurate measurements of a material's thermal and electrical properties to evaluate performance, give confidence to potential customers and accelerate commercialisation.

Reference materials allow manufacturers to calibrate measurement instruments in-house and ensure they provide accurate readings. But until recently, few reference materials were able to accurately assess thermoelectric performance, particularly at the high temperatures required by the automotive industry. Manufacturers need new reference materials to enable them to accurately assess the performance of thermoelectric materials, and accelerate the development and adoption of improved thermoelectric generators.

Solution

The EMRP project *Metrology for energy harvesting* developed two new reference materials for measuring the Seebeck coefficient – a material property which strongly influences the efficiency and power output of a thermoelectric generator. This is the first time that reference materials for Seebeck coefficients which perform reliably at high temperatures have been made available to industrial users. Additionally, unlike previous reference materials which could only be used in specific calibration instruments, the new reference materials can be adapted to fit a variety of instruments.

Impact

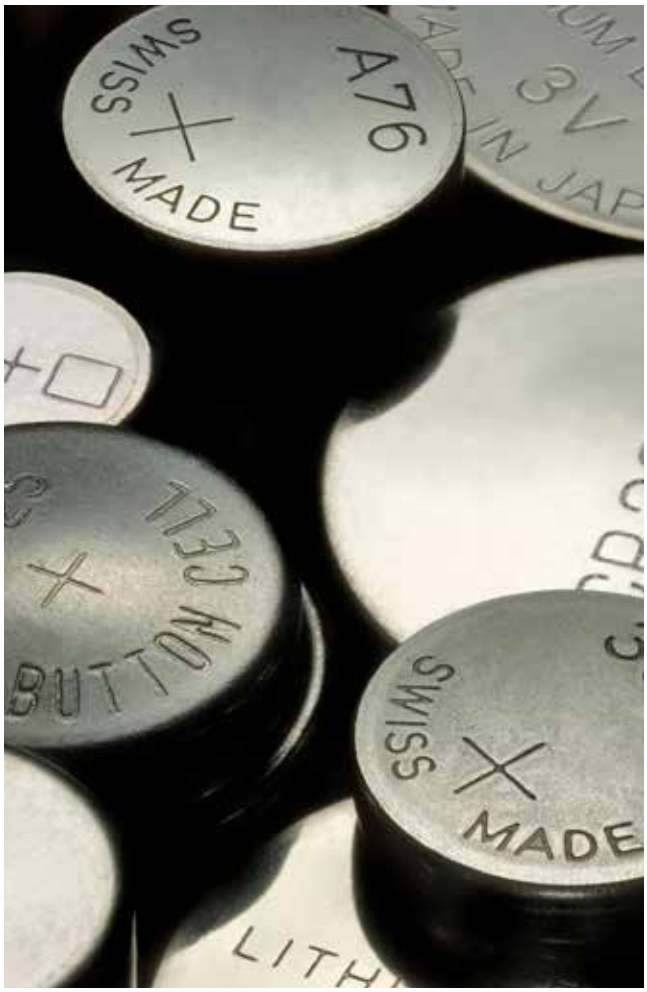
German manufacturer Netzsch has developed a high-precision instrument for measuring electrical conductivity and the Seebeck coefficient which is marketed with the new reference material. Netzsch intends to sell the instrument and reference material to research and development teams within automotive manufacturing companies.

The reference material will give Netzsch's customers confidence that the thermal efficiency measurements they make are accurate and consistent. This will allow manufacturers to reliably assess the performance of new materials developed for energy harvesting devices, and enable their customers to better compare products, encouraging uptake of the technology.

Netzsch's product provides the measurement capability needed to accelerate development and uptake of improved thermoelectric generators within the automotive industry. By making Europe's vehicles more efficient, energy harvesting technology has the potential to reduce one of the most significant contributions to Europe's greenhouse gas emissions.

Metrology for energy harvesting

This project developed the metrological framework needed to support the development of commercially-successful energy harvesting devices in Europe. Focusing on vibrational and thermal energy harvesting, the project has enabled the traceable measurement of thermal, mechanical and electrical properties, and assessment of the efficiency and effectiveness of energy harvesting technologies in different applications. This will help industry and consumers to make direct comparisons of energy harvesting technologies, and ultimately lead to lower costs and improved product performance.



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