



## High temperature piezoelectric materials for automotive, energy, process, electronics and medical industries

New technologies are being developed that will enable reductions in energy consumption and improvements in efficiency and reliability in automotive, energy, process, electronics and medical industries through the use of new piezoelectric materials which operate at elevated temperatures up to 1000 °C. These applications exploit the actuation and sensing functionality of ferroelectric materials which result from strong coupling between electrical, thermal and mechanical properties. Degradation of material properties at high temperature means that these applications are currently limited to operating temperatures typically below 200 °C.

## Electrocaloric cooling for 'clean' refrigeration

New solid-state cooling technologies are being developed, based on the electrocaloric effect. These will provide efficient cooling for computer chips and gas-free domestic and industrial refrigeration. The electrocaloric effect is observed in ferroelectric materials and is closely related to their pyroelectricity and piezoelectricity.

## New materials – new metrology

Reliable measurement is essential to provide the data required for the development of new materials technology, effective design of new devices, reliability in characterisation and test, and to ensure quality in manufacture and reliability in service. METCO will develop the metrological infrastructure and facilities within Europe for the traceable metrology of piezoelectric, ferroelectric, thermal, and electrocaloric properties at high temperatures and electric fields.

## Get involved

Successfully developing new high temperature piezoelectric and electro-caloric technologies requires industry input and multidisciplinary expertise in applications, materials science, device engineering, metrology and instrumentation.

For more information see our website at:

**<http://projects.npl.co.uk/METCO/>**

If you would like to get involved with the project and receive regular updates, please contact:

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