

The European Metrology Research Programme (EMRP) - The future of joint research

Lucy Buckby
EMRP Project Officer

The EMRP:



- supports the collaboration of European metrology institutes, industrial organisations and academia through Joint Research Projects (JRPs).
- is structured around European Grand Challenges in such areas as Health, Energy, the Environment & New Technologies.
- is based on Article 185 and implemented by EURAMET (European Association of National Metrology Institutes).
- is jointly funded by the EMRP participating countries and the European Union (50:50) and has a budget of approximately 400 M€ over seven years.

EMRP Participating Countries



- Austria
- Belgium
- Bosnia and Herzegovina
- Czech Republic
- Denmark
- Estonia
- European Commission (EC)
- Finland
- France
- Germany
- Hungary
- Italy
- The Netherlands
- Norway
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- Turkey
- United Kingdom

The EMRP Funds:



- Multi-partner Joint Research Projects (JRPs), which are primarily undertaken by the National Metrology Institutes (NMIs) and Designated Institutes (DIs) of the countries participating in the EMRP.
- Other organisations are able to participate with their own resources as Unfunded JRP-Partners or Collaborators .
- Three types of researcher grants supplement the JRPs; Researcher Excellence Grants (REGs) , Researcher Mobility Grants and Early-Stage Researcher Mobility Grants.

EMRP Call Stages

- **Stage 1** - Call for Potential metrology Research Topics (PRT). Each year stage 1 opens January and closes March.
- **Stage 2** - Call for JRP proposals, with optional, integrated Researcher Excellence Grant applications. Full Selected metrology Research Topics (SRT) documents are published with the Stage 2 call. Each year stage 2 opens June and closes October.
- **Stage 3** - Call on behalf of the JRP-Consortia for Researcher Excellence Grant (REG) and Researcher Mobility Grant (RMG) applications. Each year stage 3 opens end of March and closes at the beginning of May. JRPs from previous calls can advertise for REGs and RMGs.

EMRP Calls



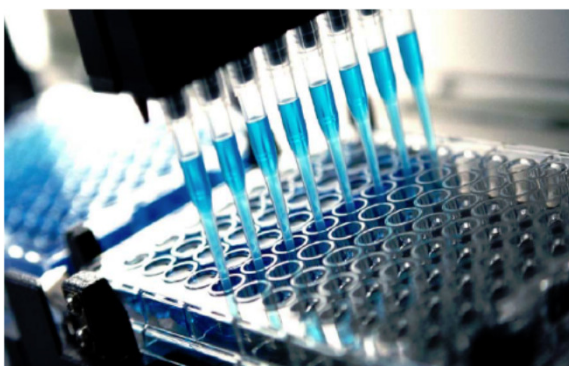
Energy - Calls in 2009
& 2013



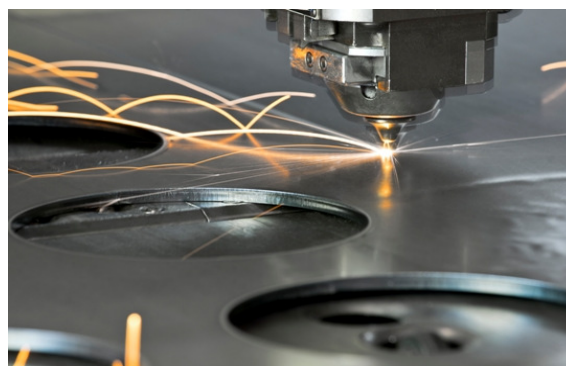
SI Units - Calls in 2011
& 2012



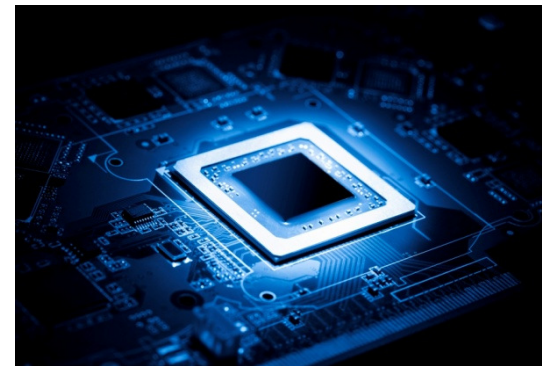
Environment - Calls in
2010 & 2013



Health - Call in 2010

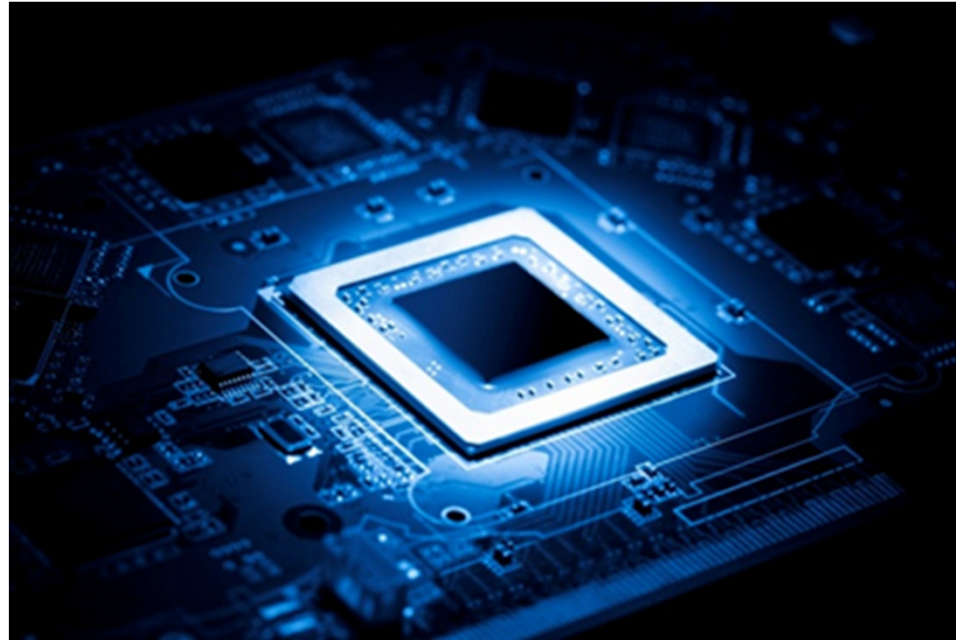


Industry - Calls in 2010
& 2012



New Technologies -
Call in 2011

New Technologies – Call 2011



Supporting developments in biotechnology, new materials, security and nanotechnology. In nanotechnology, projects will achieve new functionalities through nano-structured surfaces, optical meta-materials and nanoparticles, and address the need for integration in electronics.

NEW08: Metrology with/for NEMS

Innovative measurements for future technologies

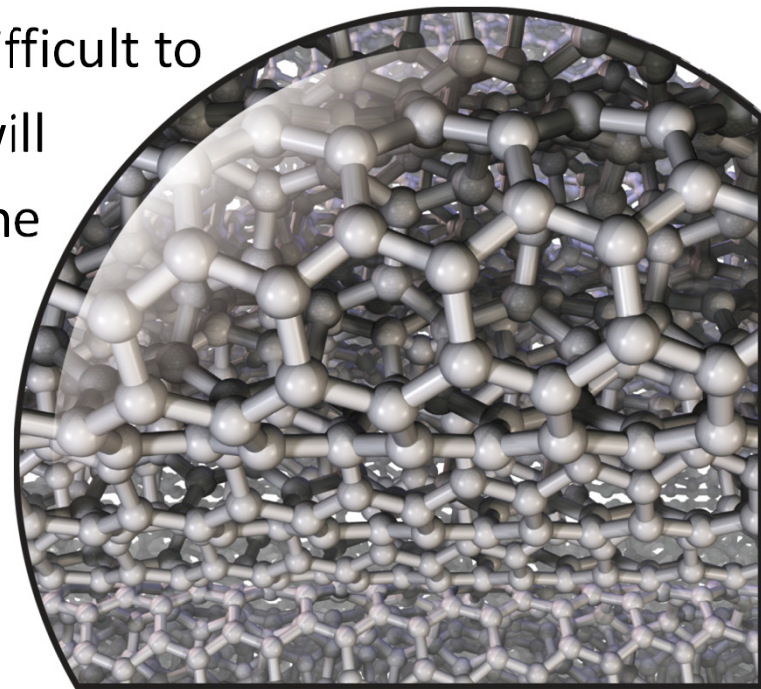
Nano-electro-mechanical systems (NEMS) integrate electrical or mechanical functionality at the nanoscale and could overcome a range of technological barriers. This project will develop better measurements of physical parameters such as mass, force, displacement and temperature, as well as single photons and molecules, at the nanoscale level to support the exploitation of NEMS devices.



NEW05: Traceable measurement of mechanical properties of nano-objects

Getting nano products to market

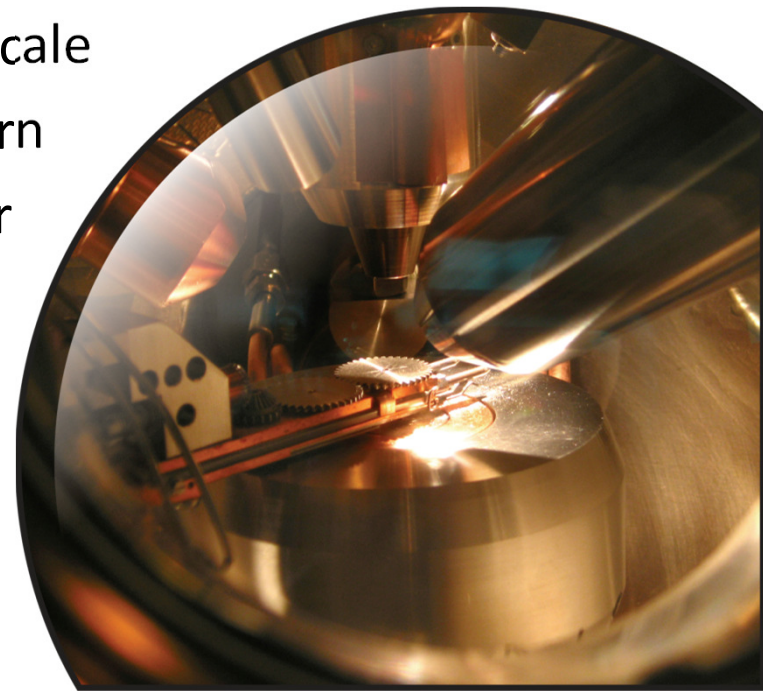
Nano-objects can be used to improve products like high strength concrete, but their small size makes it difficult to measure their properties. This project will develop measurement traceability for the mechanical properties of nano-objects such as nanoparticles, nanowires and composite materials through the development of test samples, new techniques and improved instruments.



NEW03: Chemical and optical characterisation of nanomaterials in biological systems

Supporting nanotechnology with physical, chemical and optical characterisation

Companies are increasingly using nanoscale materials in products but there is concern over the potential risk to health, as their properties can change when they interact with biological systems. This project will develop methods to characterise nanomaterial properties in biological environments.



JRP NEW03 Objectives

- To produce a series of nanomaterials (for example, oxide and quantum dot) that are characterised in their native form for size, surface charge and fluorescence. To characterise a suitable cell based model(s) for its application as a test system(s) for the interaction of nanomaterials with biological systems.
- To validate the use of a range of physical and chemical techniques for measuring the size and chemical composition of nanomaterials in a serum based biological system. Measurement techniques will cover chemical analysis (ICP-MS), light scattering (MALS, DLS, NTA), X-ray technologies (SAXS), centrifugal sedimentation (DCS) and nanoparticle charge analysis (SIOS, ELS, Z-NTA).

JRP NEW03 Objectives

- To develop traceable methods for the characterisation of bulk optical properties of fluorescent nanomaterials, particularly quantum yield, absorption coefficient and corrected emission spectra. To develop methods for the characterisation of fluorescent nanomaterials at the single particle level including intermittency, photo stability and environmental sensitivity in a serum based biological system.
- To develop methods for the simultaneous characterisation of physical and chemical composition of nanomaterials in cell based biological systems.
- To develop measurement techniques for biotechnology using fluorescent nanomaterials.

JRP NEW03 Progress

So far the JRP has:

- Selected suitable nanomaterials for physical, chemical and optical characterisation in biological matrices
- Preliminary physical characterisation including small-angle X-ray scattering (SAXS) and nanoparticle tracking analysis (NTA).
- Performed measurement techniques for the traceable optical characterisation of fluorescent nanomaterials.
- Selected spectral fluorescence standards and quantum yield standards for determining relative and absolute fluorescence quantum yield in aqueous media and biological serum.
- Following consultation with stakeholders, a biotechnology assay, biomarker of interest and fluorescent nanoparticles were agreed.



JRP NEW03 Impact



1. Primary beneficiaries are nanobiotechnology and nanomedicine organisations - provided with validated protocols for analysis.
2. Regulatory bodies and legislators - provided with data recommendations for policy formulation. JRP-Consortium representation in standardisation and metrology committees includes; ISO/TC-229 (Nanotechnology), ISO/TC 201 (Surface Chemical Analysis), CEN TC-352, CCQM Bioanalysis working group (BAWG) and Surface Analysis Working Group (SAWG).
3. Manufacturers of nanomaterials who will be able to operate under a reasonable, rather than overly stringent, regulatory framework.



European Metrology Programme for Innovation and Research (EMPIR)



Fundamental
Scientific
Metrology

Grand
Challenges

Innovation

Pre- and
Co-normative
research

Capacity
Building

Questions?

<http://www.euramet.org/>

<http://www.emrponline.eu/>

Email: emrpA169@npl.co.uk

Tel: +44 20 8943 6666