



**NAME : LABORATOIRE NATIONAL DE METROLOGIE ET D'ESSAIS
(LNE)**

INSTITUTION : LNE

COUNTRY : FRANCE

Profile :

The Laboratoire National de métrologie et d'Essais (LNE) is committed to excellence in measurement and testing and to progress in quality and safety, for the benefit of industries and consumers alike. Since 1997, LNE pursues its scientific and technological development in order to anticipate new measurement and testing requirements created by advances in technology and society's new expectations in the spheres of safety, health, quality and environmental protection. It's mission is to provide state authorities and key economic players with the technical assistance they require to draft new regulations and standards at national, european and international level, develop new test methods and carry out market surveillance. Furthermore since 25 January 2005, LNE has been responsible for steering and coordinating metrology activities in France and representing French metrology at international level. One of the key missions of the LNE is to establish the metrological traceability and to assess the uncertainty of analytical measurements, necessary to enhance the reliability of measurements. To this end, LNE implements primary reference methods and produces Certified Reference Materials (CRMs) for various applications in the field of industrial, environmental and health analysis. Expertise of LNE relies on almost 250 metrology engineers and technicians, over half of whom are involved in scientific and technological research activities.

LNE has four main areas of research on materials: Characterization of products/nanomaterials characteristics and properties, Degradation of materials, End-life of materials.

The laboratory is involved in a lot of collaborative projects at national and European levels (via EMRP or FP7 calls), take part in organizing events as the International Congress of Metrology, summer school on materials... and is also an Authorized Training Organization Office in order to disseminate its scientific competencies.

Activities :

- Research in the field of materials science: in advanced polymer materials (polymer nanocomposites) with the aim to reliably characterize properties of materials thanks the development of metrological methods traceable to SI units, provide data for the characterization of products (nanoparticles, gases) emitted during the combustion or incineration process of material and assess the impact on the composition and microstructure of ultra-fine particles that can be found in the released aerosols ; in material-environment interactions with the aim to evaluate the dispersion of combustion products following accidental or deliberate combustion of materials having nanoparticles in their formulation, investigate and control materials impact on the sanitary quality and environment, assess the migration of chemical species (food packaging, furniture and textiles)
- Performances testing of materials for materials producers (isolation properties, mechanical characteristics, migration of chemical species, ...)
- Ageing of materials
- Reference material producers



Expertise on following materials :

- polymer composites (with nanofillers, glass-fillers, CNT, ...)
- sandwich-structured composite
- nanomaterials / nanoparticles
- plastics
- biopolymers
- chemicals

Actual research domains concerning materials technology / Competences :

1/ Characterization of products/material properties

- electrical properties
- thermal properties
- mechanical properties
- migration of chemical species (e.g. food packaging, furniture and textiles..)
- reference measurement protocols for nanoparticles main parameters

2/ Ageing of material

- stress tests (temperature, pressure, UV, corrosion, salt spray...)
- modelling

3/ Food contact material

- evaluation of biodegradability of bio-based materials
- characterization and quantification of chemical species present in food packaging materials

4/ Degradation of materials (use, burning / incineration)

- mechanisms for thermal degradation of nanostructured materials
- modelling thermal degradation by multi-scale approach
- measurement and characterization of products released during incineration of materials
- impact on the composition and microstructure of ultra-fine particles that can be found in the released aerosols

5/ End-life of materials

- modeling of the dispersion and transport of solid degradation products (fibres/particles) and gaseous ones

6/ Development of reference material

- Charpy specimens for mechanical testing
- Different kinds of chemical species used as flame retardants (PBDE, ...) for environmental applications

Available research infrastructure :

Burning of materials

- Cone calorimeter (ventilated or under ventilated)
- Tubular furnace,
- Single burning Item
- Medium burning Item

Analytical platform for characterizing material & nanomaterial

- Atomic Force Microscope (AFM)
- Scanning Electron Microscope (SEM) with EDX and STEM detectors



European Network of Materials Research Centres

- X- Ray Diffractometer (XRD)
- Dynamic Light Scattering (DLS)
- Zeta-meter
- BET
- Scanning Mobility Particle Sizer (SMPS)
- Condensation Particle Counter (CPC)
- Differential Mobility Spectrometry (DMS)
- Atomizer
- Powder aerosoliser
- Electropray
- Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
- Fourier Transformed Infra-Red spectroscopy (FTIR)
- X-ray fluorescence (XRF) spectrometer
- Solid Phase Extraction (SPE)
- Gas chromatography

Ageing of material

- salt spray test chamber

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