# NON-DESTRUCTIVE ANALYSIS & CONTROL INTO THE MATTER

R&D DEVELOPMENTS

SOLUTIONS

AND SERVICES

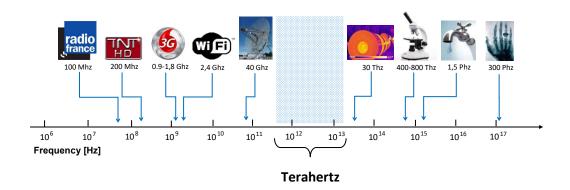


# DESIGN & MANUFACTURING—TeraHertz deployable solutions for industry and science

Based upon **10** years of experience in TeraHertz optronic technologies, our engineers and researchers ensure the design and development of generic or customized systems for the analysis or control of materials. Based on material samples, we demonstrate the feasibility and performance of our solutions on **our technological platform**.

Our partnership with the **CNRS** and the **University of Montpellier**, combined with our expertise in technology transfer, allows us to propose very innovative solutions while meeting the requirements of industrial and scientific applications.

# ▶ A new domain of electromagnetic waves with huge potential of applications



# Disruptive innovations in the field of non destructive analysis and control



### **PROVIDES DATA**

- Inner structural
  - 3D + spectral
    - Real-time
- At a macromolecular scale



**BY A MEAN** 

- Contactless
- Non destructive
  - Harmless
- Non invasive



**FOR APPLICATIONS** 

- Content measurement, density
  - Thickness measurement
    - Imaging, tomography
      - Spectrometry

# **Examples of TeraHertz analysis and control**





Control of a polymer-composite adhesive bond



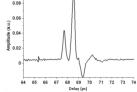
Fibers alignment rate
in a composite material



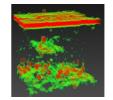


Defect control in composite material with fabrics reinforcements

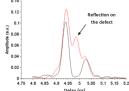




Thickness measurement of multilayer coating on carbon-epoxy composite



0,68 0,45 0,23



Mapping of delamination in the depth of a composite patch

### IMPROVING SCIENTIFIC AND INDUSTRIAL PERFORMANCE

► For automatic applications or providing assistance to operators

3&D

# Materials/Manufacturing processes analysis

- Understanding of new materials and their performances
- Development of manufacturing processes by analysis the inner properties of materials
- Quantification of inner parameters for the development of numerical models

RODUCTIO

# **Quality control**

- Defects in materials or products (heterogeneities, anisotropy)
- Defects of materials assembly (adhesion, cohesion, dimensions)
- Defects in composite materials
- Inner defects of encapsulated or packaged products
- Contamination of materials (metal, glass, stone, biological agent ...)
- Alignment rate and fiber orientation in composite materials
- Purity (crystallinity, polymorphisms ...) of materials

# **Manufacturing process control**

- Monitoring of process parameters (products, materials)
- Process guidance based upon in-heart sensors (moisture content, density, polymerization ...)

**XPLOITATION** 

# Inspection/expertise

- Material aging monitoring (mechanical impact, water recovery, stress ...)
- Preventive/Predictive maintenance
- Repair qualification
- Integrity non-destructive expertise
- Counterfeit product analysis

For various applications, matter focused or manufacturing process focused

### **MATTERS**

Polymers, Rubbers, Foams

Ceramics, Glasses

Composites, Honey comb Sandwiches

Wood, Papers, Cardboards

Plasters, Cements

Semi-conductors

### **PROCESSES**

Assembling, Separation

Multi-layer coating

Addition of reinforcement, Fillers

Drying, Hydration, Heating

Welding, Gluing

Coating, Packaging

# **► OUR COMPETENCIES**

- Opto-electronics
- Mechanical
- Physics, chemistry of materials
- Software development
- Signal & image processing
- Systems engineering

### **► OUR SOLUTIONS**

- Measurement of water content
- Measurement of filler content
- Heterogeneity imaging
- Anisotropy imaging
- Thickness measurement
- Spectrometry

## **▶ OUR EQUIPMENT OF ANALYSIS AND CONTROL**

### IN-DEPTH



TK-LAB RANGE

# FAST

TK-LINE RANGE

### **PORTABLE**



TK-FIELD RANGE

### **► OUR SERVICES**

- Feasibility studies Tests on samples
- Technical specification elaboration
- Prototyping
- Design & development
- Assistance to commissioning
- Training

### **► OUR TECHNICAL MEANS**

- Multidisciplinary team
- Materials characterization platform
- TeraHertz waves simulation software
- TeraHertz multimodal analysis benches
- Oven with controlled temperature and humidity

### **► CONTACT**



### **TERAKALIS**

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