



# Mat-Light 4.0

New Insight in Materials and Light

## Presentation of the Mat-Light 4.0 Platform

The Mat-Light 4.0 platform, led by the University of Haute-Alsace (UHA) and CNRS, represents a cutting-edge initiative at the intersection of materials and light, focusing on innovation, applied research, and industrial needs. As a winner of the ExcellencES program with a budget of €50 million, Mat-Light 4.0 stands out through a multidisciplinary approach and advanced use of light technologies in future materials, with three main platforms: automated chemical synthesis, 3D/4D printing, and hybrid electronic spectroscopy characterization.

Mat-Light 4.0 also features a high-throughput screening platform, an automated tool for studying new chemical reactions. This allows industries to optimize their material synthesis processes efficiently, saving time and resources through miniaturization and automation. Combined with artificial intelligence technologies, this platform facilitates the rapid exploration of material combinations in key sectors such as healthcare, polymers, and sustainable materials.

Mat-Light 4.0's 3D/4D printing and molecular characterization platform is a major asset for advanced research in materials and light. Its flagship equipment, a volumetric 3D printer unique in France, enables the creation of complex structures in under 30 seconds, fostering significant advancements in photopolymerization and additive manufacturing. Additionally, the platform includes a time-resolved spectrofluorometer, capable of exciting and detecting signals from UV to near-infrared, providing precise and comprehensive molecular characterization capabilities.

The material characterization platform offers unique capabilities for mesoscale ( $\mu\text{m}$ ,  $\text{nm}$ ) material characterization through innovative techniques such as time-resolved cathodoluminescence (TR-CL), photoluminescence (TR-PL), Raman spectroscopy, and a nanoprobe station. These tools allow detailed study of material properties under local stimuli (laser pulses, electrons) and real-time tracking of structural transformations. This setup is particularly suited for studying advanced materials for applications in electronics, sensors, and optics.

Industries can benefit from direct collaborations with UHA, gaining access to state-of-the-art resources and an Open Lab designed to foster innovation and entrepreneurship. This collaborative laboratory enables the development of projects tailored to current and future technological needs, providing companies with a privileged setting for exploring and implementing new material solutions.

Mat-Light 4.0 thus serves as a strategic partner for industrial players seeking innovative solutions in advanced materials, manufacturing processes, and cutting-edge material analysis.



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RECHERCHE

FORMATION

INNOVATION



PLATEFORME DE RECHERCHE

**Plateforme de caractérisation des matériaux**

Exemple: cathodoluminescence et photoluminescence résolu en temps

IMPORTANT

Unique au monde



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**Plateforme de synthèse automatisée**

Exemple:  
Système de synthèse complète automatisée et d'analyse qui optimise les paramètres de synthèse en utilisant l'IA

IMPORTANT

Unique en France



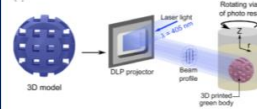
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**Plateforme d'impression 3D / 4D**

Exemple:  
Imprimante 3D volumétrique ✓

IMPORTANT

Unique en France



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MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE

**Plateforme de caractérisation moléculaire**

Exemple:  
Spectrofluorimètre résolu en temps avec une excitation et détection de l'UV au proche infrarouge

IMPORTANT

Dernière génération



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