



IMT Mines Alès
École Mines-Télécom



Technological platform

*Assessment of medical devices for
Odontology and Stomatology*

KEYWORDS: Physicochemical characterisation, biomechanical tests, predictive numerical modelling, CAD/CAM of medical devices, *in vitro* / *in vivo* / *in silico* assessment of materials, validation of clinical protocols, dental biomaterials

OUR AIM

Provide a platform for testing, measuring and analysing materials, and validating manufacturing methods and clinical processes for manufacturers and researchers involved in the development of dental medical devices

ACTIVITIES

- Assessment of materials and technical devices
- Introduction of new materials in the oral/dental field

SPECIFIC FEATURE



Regional partnership:

- Montpellier University Bioengineering and Nanosciences Laboratory (LBN) Odontology Research Unit
- Montpellier University Hospital Dental Care and Research Centre (CSERD)
- IMT Mines Alès: Materials Centre, (C2MA), ISR (LGEI)

FIELDS OF APPLICATION

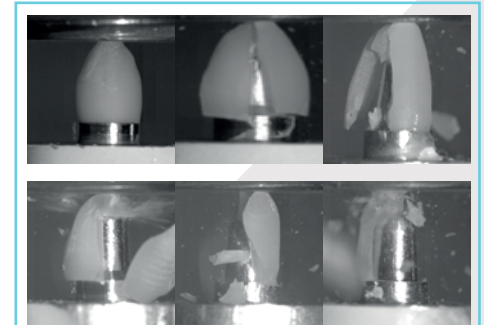
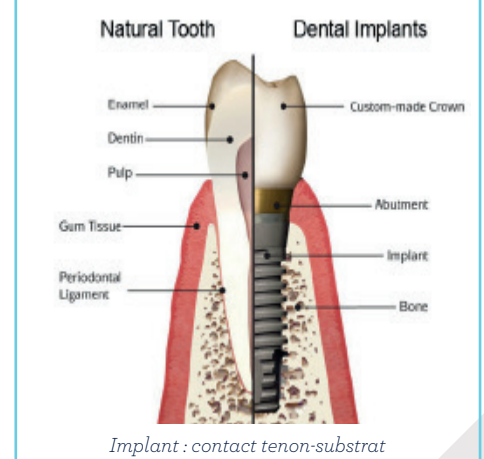
- Odontology
- Stomatology

5 TECHNICAL SUPPORT UNITS

- Biomechanical tests
- Physicochemical characterisation
- Biocompatibility
- Histology
- Clinical research

KNOWHOW AND SCIENTIFIC EXPERTISE

- Analysis of the behaviour of dental materials and structures in hydro/hygro-thermal, UV, biological and mechanical situations
- Assessment of materials and technical devices
- Multiphysics numerical modelling with finite element methods
- Characterisation of the surface state of materials
- Chemical characterisation of materials (confocal Raman microscope)
- Clinical studies
- Assistance with drawing up and submitting validations to authorities
- Optical studies: speckle interferometry



Multi-instrumental assessment of the strength of ceramic tooth caps

WHAT WE PROVIDE

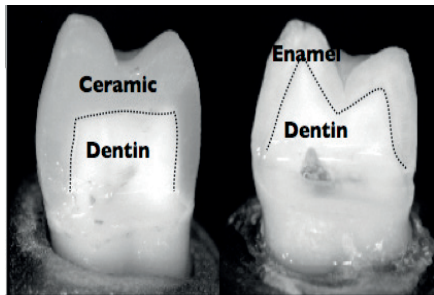
Research partnerships Training
Technical, scientific, clinical and legal expertise

MAIN PARTNERS



Three centers leading cutting-edge research for and with companies.

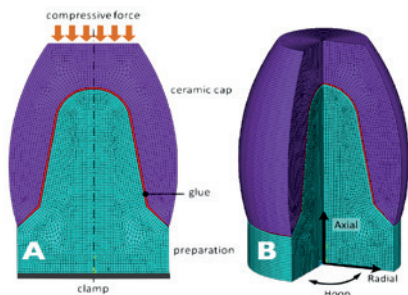
RECENT PROJECTS



Prosthetic crown Natural tooth

Study of the enamel-dentin junction to increase the durability of ceramic dental crowns

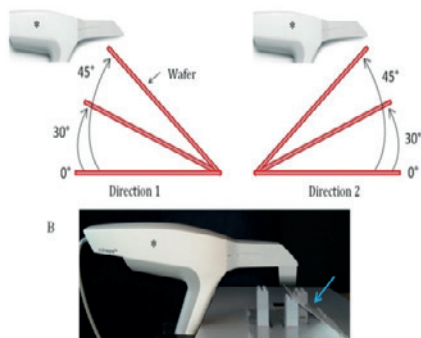
In a natural tooth, the enamel-dentin junction enables it to accommodate stresses and pressures due to mechanical loads. The aim of designing prosthetic tooth reconstructions whose mechanical characteristics imitate those of a natural tooth is to increase their strength and ensure their durability. Design/manufacturing: Chairside CAD-CAM. Micromotion measurement technique: speckle interferometry



FE modelling of tooth reconstruction

Assessment of stresses and strains for CAD-CAM manufactured ceramic peripheral tooth caps

The aim is to identify and optimise the geometrical parameters that affect the strength of ceramic tooth caps. *In vitro* analysis and *in silico* analysis (numerical modelling by Finite Elements) show that an optimised geometrical design can increase the mechanical capacities of ceramic dental reconstructions by up to 80%



Intraoral scanner

Assessment of the accuracy of IOS for intraoral impressions

There are more and more IOS (intraoral scanners) available on the market. A rapid assessment of their accuracy and quality is a decisive factor in choosing an IOS. This choice is generally complex and operator-dependent. A simple and original methodology for evaluating IOS noise has been developed and could become a model for the initial assessment of the accuracy of this type of scanner.

Sources and photo credits : Frédéric J.G. Cuisinier, Michel Fages, Ivan Panayotov, C2MA, LGEI-ISR

MAIN EQUIPMENT

- High- resolution atomic force microscope
- Confocal Raman microscope
- Scanning electron microscope
- X-ray diffractometer (XRD)
- Intraoral scanner
- Mechanical testing machine
- 5-axis milling machine

The IMT Mines Alès research centers

- C2MA Materials Research Center
- LGEI Center of Industrial Environment and Industrial and Natural Risk
- LGI2P Center of Computer and Production Engineering

IMT Mines Alès, 6 avenue de Clavières, F-30100 Alès - www.mines-ales.fr

Platform cofounded by:



You want to develop a project ?

Contact details

patrick.ienny@mines-ales.fr
stephane.corn@mines-ales.fr
pierre.slangen@mines-ales.fr

<http://c2ma.mines-ales.fr>
<http://lgei.mines-ales.fr>