

# LAAS-CNRS: Laboratory for Analysis and Architecture of Systems (David Pech)

- LAAS
  - CNRS lab located in Toulouse, France
  - Associated to the University of Toulouse
- Taskforce
  - 700 among which 300 researchers and engineers
  - 60 PhD students graduating/year
- Budget
  - 3 M€/month (including salaries)
  - Main funding sources: 60% National, 20% Europe and 16% Industrial partnership/Innovation
- 5 (ERC & European contracts)/year
- 10 Patents/year – 4 Licenses/year
- 1.5 Publications/day (50% in the first quartile)



GDR Nanomaterials for Energy Applications

ELABORATION  
MEASUREMENTS & METROLOGY  
SIMULATIONS & THEORY  
APPLICATIONS



# 4 major research fields

## COMPUTER SCIENCE



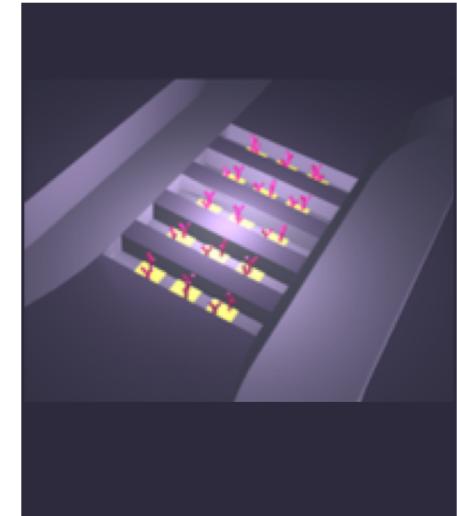
## AUTOMATIC CONTROL



## ROBOTICS



## MICRO & NANOSYSTEMS



Micro & Nano Bio Technologies

Microwaves & Optics

Energy Management

# Energy Management Department

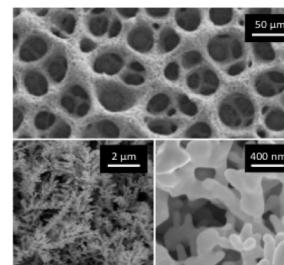
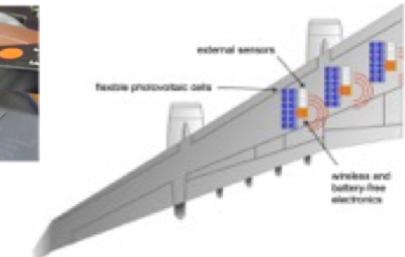
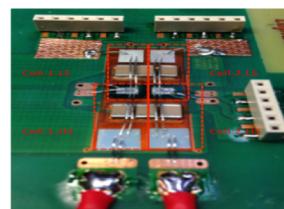
Address challenges related to energetic efficiency and sustainable development



## Strategy:

- Predictive modelling, simulation
- Technological developments
- Physical and electrical characterization

- Energy management: from nanomaterials to system
- Energy self-sufficiency of embedded systems
- Reliability: ESD/CEM, thermo-electric modelling



## Applications:

- Renewable energy sources, Power grids, Transports, Space, Aeronautics, Pyrotechnics,...

# NEO Team : Nano-Engineering and integration of metal-Oxide-based nanostructures and their interfaces

**(Alain Estève, Carole Rossi, Mehdi Djafari-Rouhani, David Pech)**

## AXIS 1. Design and integration of nanothermites for pyroMEMS

- Fundaments of nanothermite materials (multi-scale modelling and characterization of basic mechanisms)
- Nanoengineering of reactive interfaces
- Aging
- PyroMEMS for ignition applications
- Pressure/Gas production

## AXIS 2. Design and integration of novel materials for micro-energy storage

- Fundaments of chemical processes in micro-supercapacitors
- Innovative materials and nanostructures for micro-supercapacitors and micro-batteries
- On a chip integration

## AXIS 3. Nanoengineering of novel materials and catalysts for H<sub>2</sub> production

- Fundaments of water splitting processes (electronic, plasmonic, chemical)
- Innovative nanomaterials and nanostructures for photo-reduction of water (water splitting)
- Devices integration and demonstration

ERC Advanced Grant "PyroSafe" (2019-2024) on the *Integration of new nano-engineered safe energetic layers with sensors and electronics to manufacture safety-critical microsystems*

ERC Consolidator Grant "3D-CAP" (2018-2023) on the *3D micro-supercapacitors for embedded electronics*



Juillet 2015