

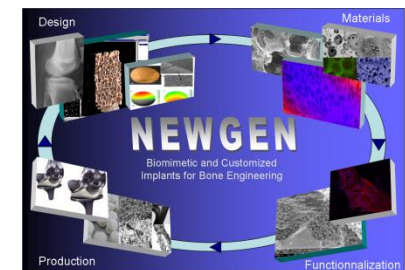
# LDP-UPM / Product Development Lab, Universidad Politécnica de Madrid GENERAL PRESENTATION



- **Complete denomination:** Product Development Lab, Mechanical Engineering Department, Universidad Politécnica de Madrid
- **Location (city, country):** Madrid, Spain
- **Director:** Prof. Pilar Lafont Morgado
- **Contact person in NEWGEN:** Prof. Andrés Díaz Lantada
- **Working Group involvment:** WG1
- **Staff:** Prof. Lafont Morgado, Prof. Díaz Lantada, Tech. Pedro Ortego
- **Research topics:** Advanced scaffolds, mechanical metamaterials, controlled porosity of materials and implants, teaching / learning activities
- **Researchers expertises:** Design and manufacturing with polymers, development of medical devices, biomechanics & bioengineering, computer-aided design, engineering and manufacturing



**LDP-UPM**  
Univ. Politécnica de Madrid  
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28006, Madrid - SPAIN



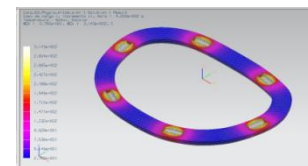
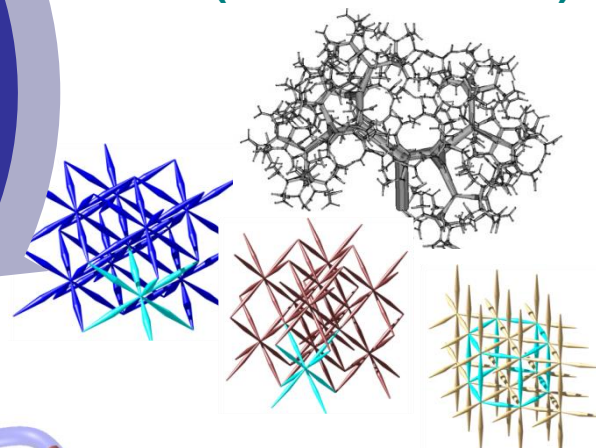
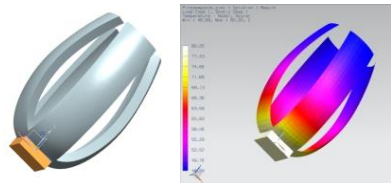
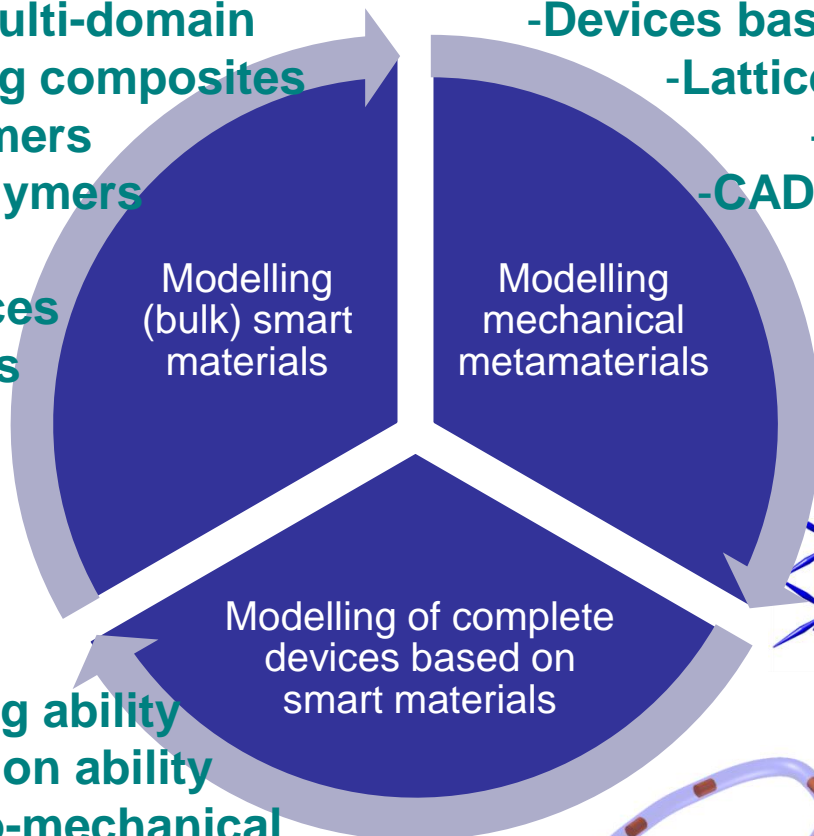
**COST Action MP1301**



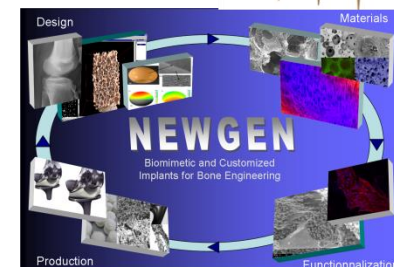
**ACTIVITIES LINKED TO MODELLING**

- Multi-physical & multi-domain
- Quantum tunnelling composites
- Piezo & pyro-polymers
- Shape memory polymers
- Hydropolymers
- Peltier based devices
- Mc Kibben muscles
- IPMCs...

- Devices based on fractal geometry
- Lattice and porous materials
- Auxetic metamaterials
- CAD libraries for designers
- Behavior modelling (FEM and more)



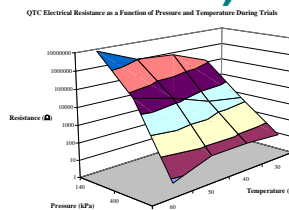
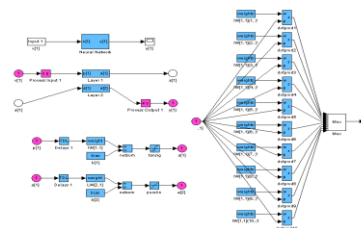
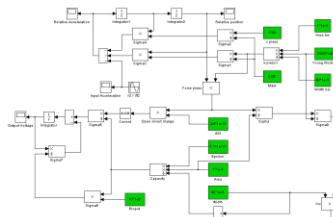
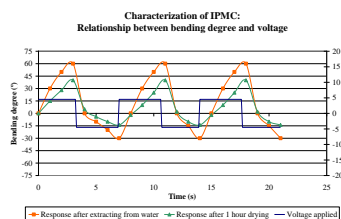
- Implants with sensing ability
- Implants with actuation ability
- Other thermo-electro-mechanical sensors & actuators and self-sensing devices



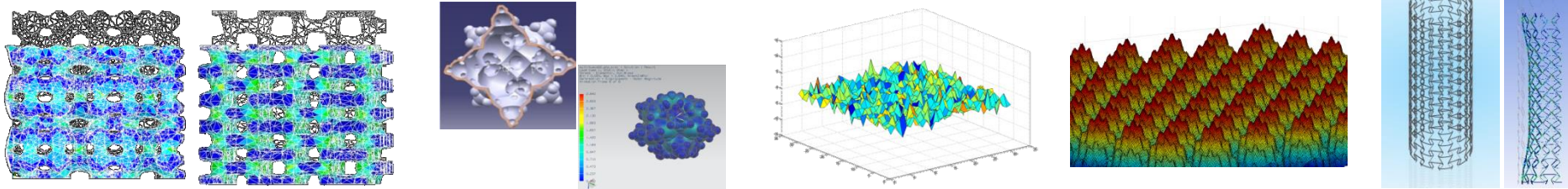


## ACTIVITIES LINKED TO MODELLING

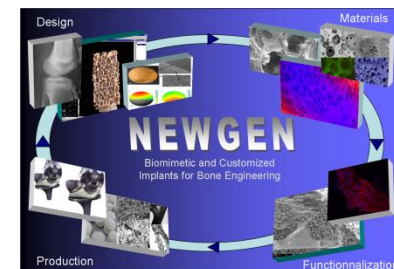
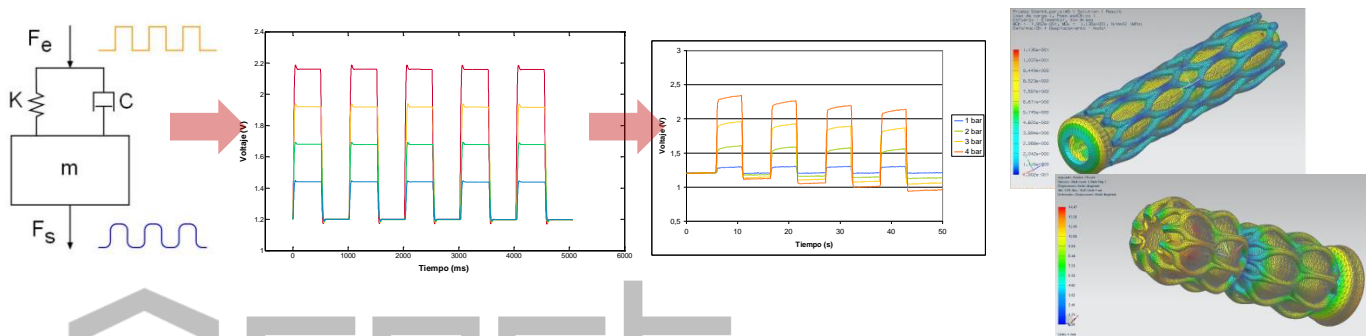
### -Modelling smart materials (prior to integration into complex devices)



### -Modelling mechanical metamaterials



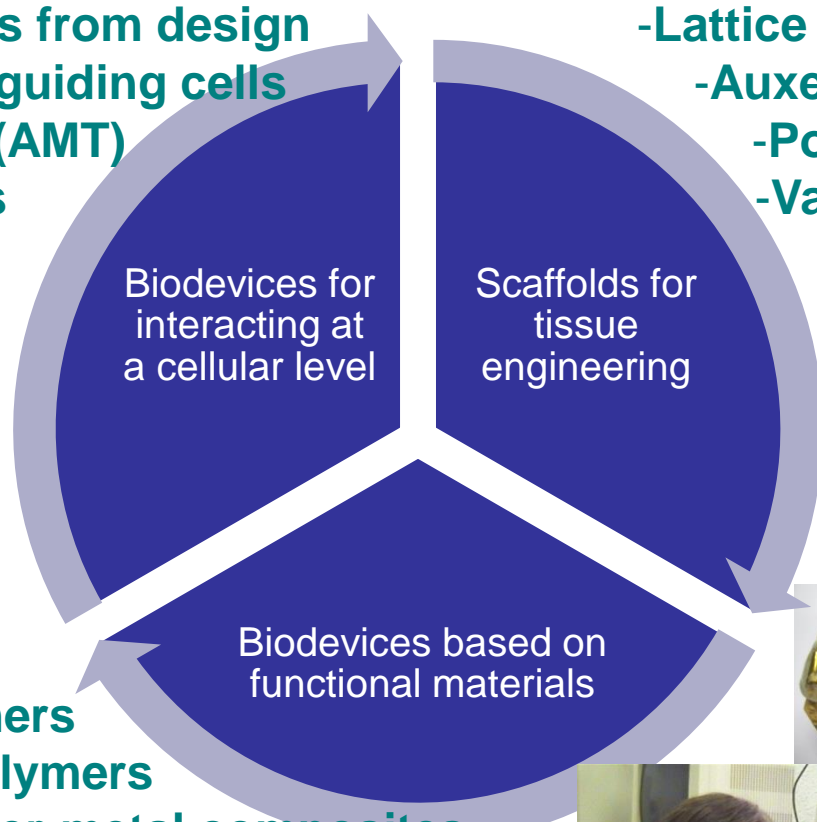
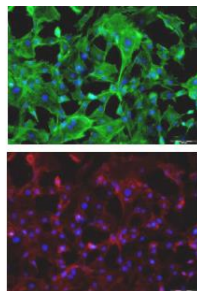
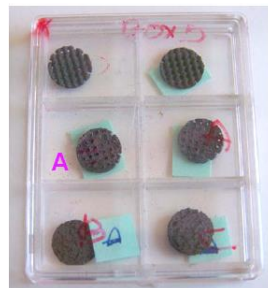
### -Modelling of complete devices based on smart materials



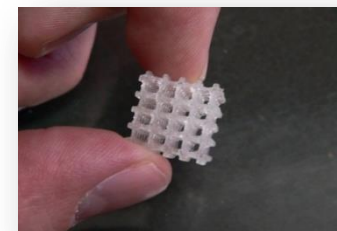
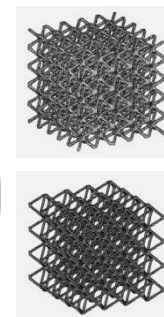


**ACTIVITIES LINKED TO BIOMATERIALS**

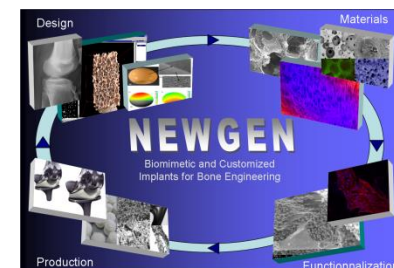
- Controlled textures from design
- Microsystems for guiding cells
- Rapid prototypes (AMT)
- CVD/PVD coatings



- Lattice structures from design
- Auxetics and metamaterials
- Porous polymers (PDMS)
- Vacuum casted materials



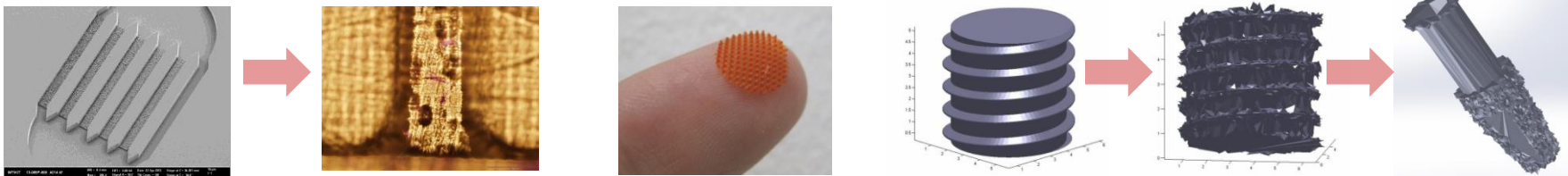
- Piezo&pyro-polymers
- Shape memory polymers
- Conductive polymer-metal composites (quantum tunnelling composites)



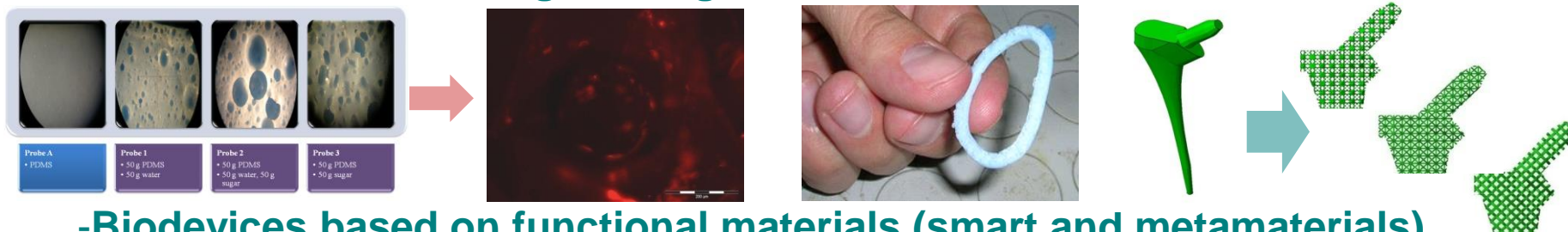


**ACTIVITIES LINKED TO BIOMATERIALS**

**-Biodevices with controlled surfaces for interacting at cellular level**



**-Scaffolds for tissue engineering and related microstructured implants**



**-Biodevices based on functional materials (smart and metamaterials)**





### Design and simulation:

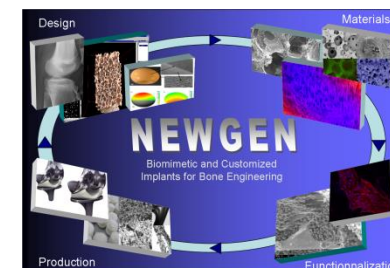
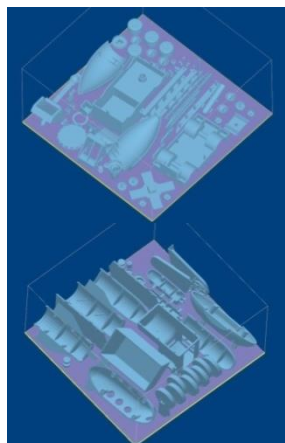
- CAD-CAE-CAM software
- CATIA, Solid Edge, NX-8...
- Multiple formats
- 20 computers in design room

### Advanced manufacture:

- Laser stereolithography
- 3D printing
- Vacuum casting
- Microfusion
- Silicone and ceramic molds

### Microfabrication:

- Mask-less photolithography
- Spin coating
- Chemical deposition
- Accesories for cleaning, curing...





## Technical University of Madrid – UPM

[www.upm.es](http://www.upm.es)

Some figures:

45000 students

3500 teachers

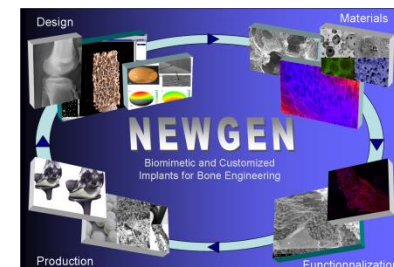
20 faculties

3+ campuses

10 research institutes



Research oriented university with historical background of  
collaboration with industry



COST Action MP1301