# POLITO-LINCE

## GENERAL PRESENTATION

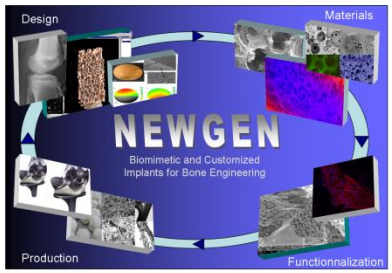
- **Complete Denomination:** Politecnico di Torino, LINCE laboratory, DISAT
- **Location:** Torino, ITALY
- **Director**: Prof. Laura MONTANARO
- **Contact person in NEWGEN**: Dr. Paola PALMERO
- **Working Group involvment**: WP1 (WP2)
- **Staff**: Dr. Paola PALMERO, Dr. Mariangela LOMBARDI
- **Research topics**:

Bioceramics for load bearing applications and for bone substitutes; traditional and advanced ceramics, functional and structural ceramics; hybrid polymer-ceramic materials;

- **Researchers expertises**:

Synthesis, processing, shaping, densification; functional and mechanical characterization


**POLITO-LINCE**
Politecnico di Torino, DISAT
Corso Duca degli Abruzzi,24
10129, Torino - ITALY


**COST Action MP1301**

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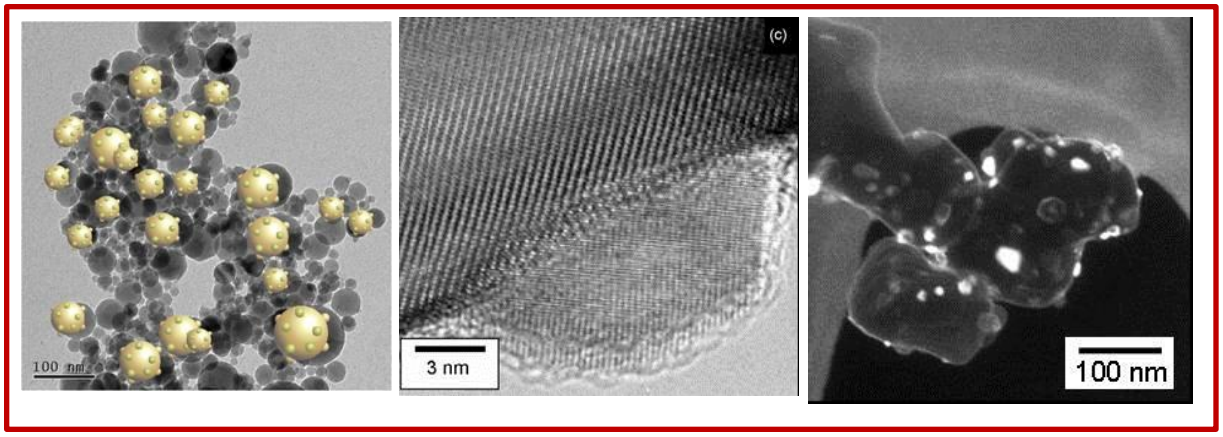
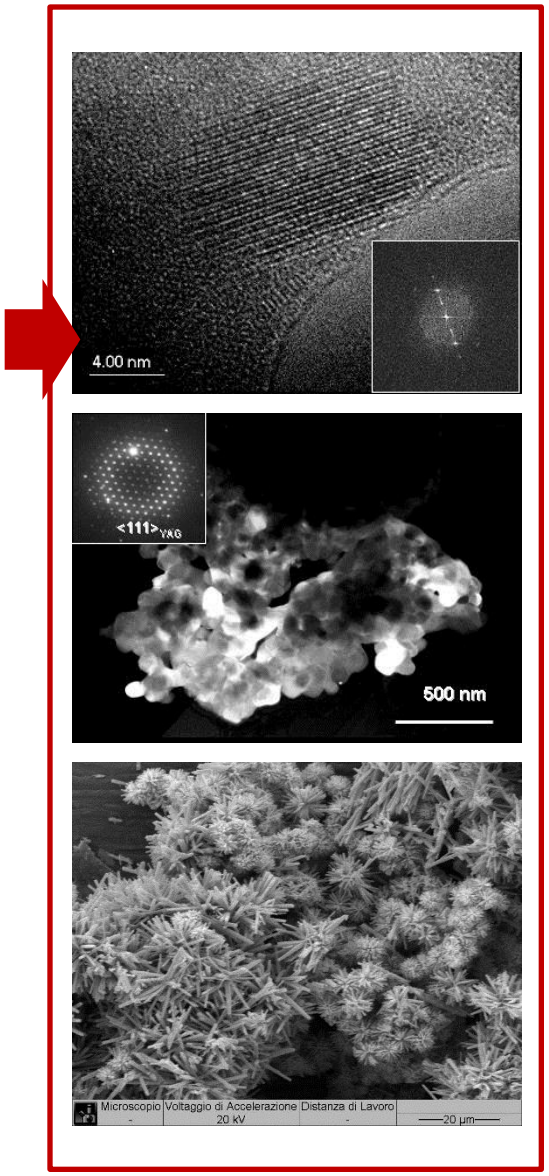
# Raw materials synthesis

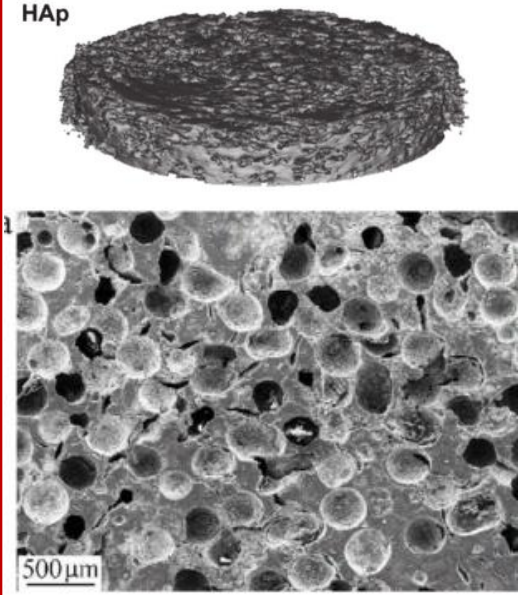
- **Wet-chemical syntheses** (sol-gel, precipitation, hydrothermal synthesis) of monophasic and composite powders;
- **Innovative synthesis methods** for the elaboration of composite/nanocomposite powders: **Surface coating route**

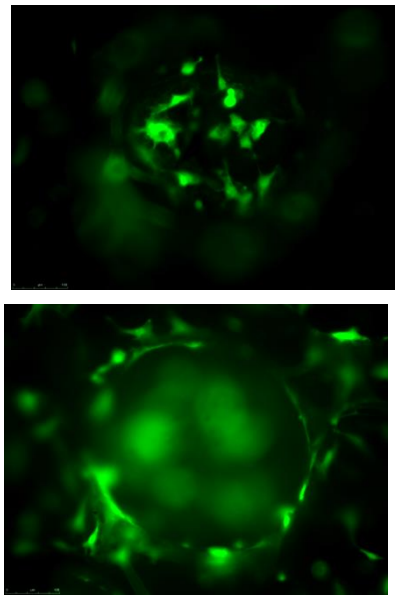


# Bone substitutes structure

**Ceramic porous materials by gel-casting / fugitive phase (PE spheres) and by replica methods: controlled micro and macro-porosity**

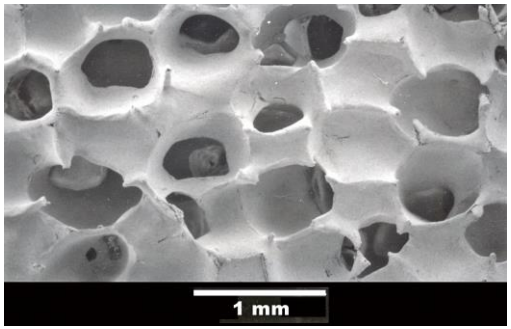


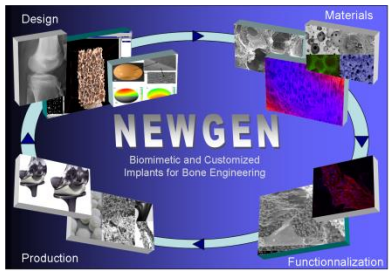



Osteoblast on the surface and in the pores of HAp porous samples (in collaboration with the University of Roma)

Porous HAp by gel-casting / fugitive phase method

Ceramic foam by replica method

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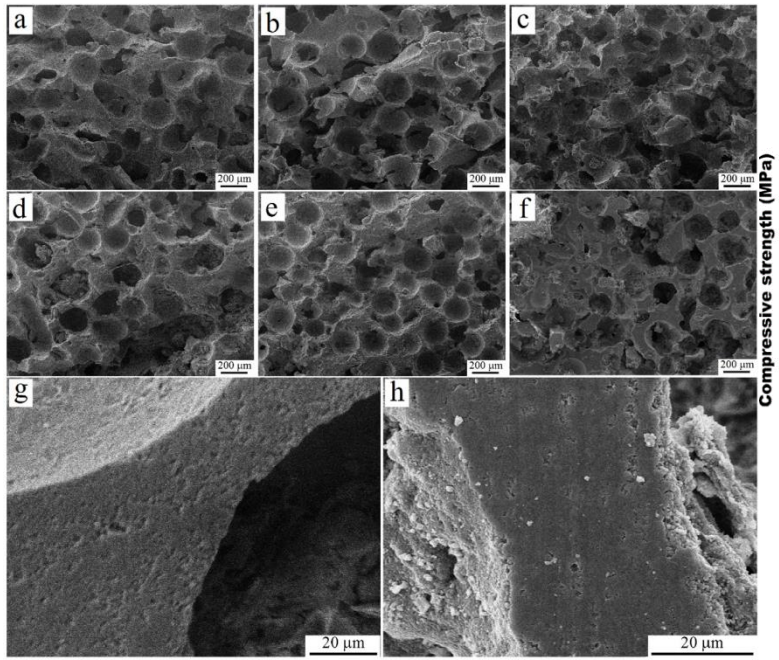
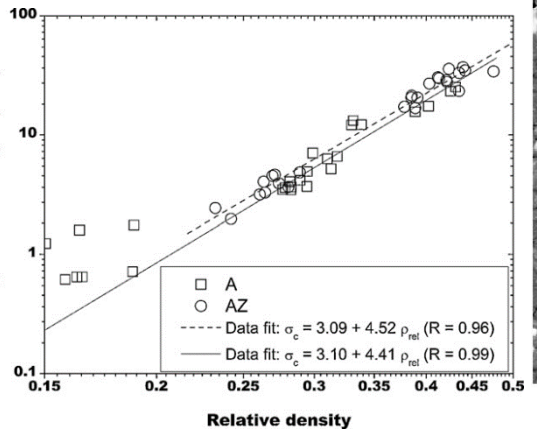
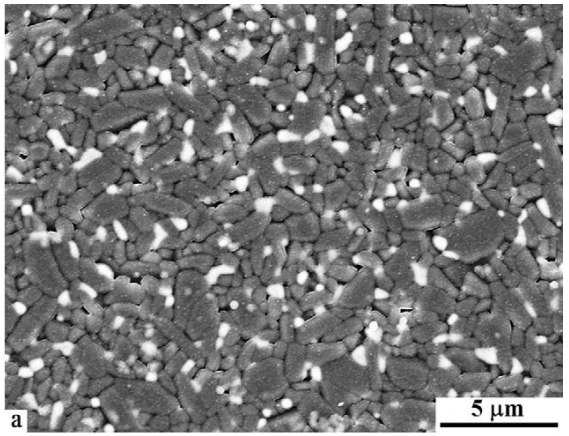
# Innovative porous materials

## Alumina-$ZrO_2$ porous materials prepared by gel-casting/fugitive phase method



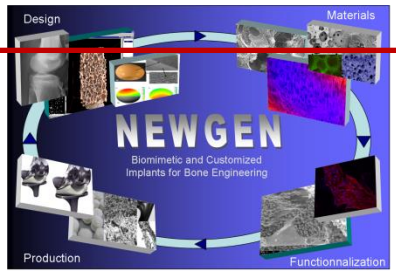




**In collaboration with Pr. L. Gibson, MIT**

**J Eur Ceram Soc 2013**

**Controlled macro (up to 70vol%) and microporosity**

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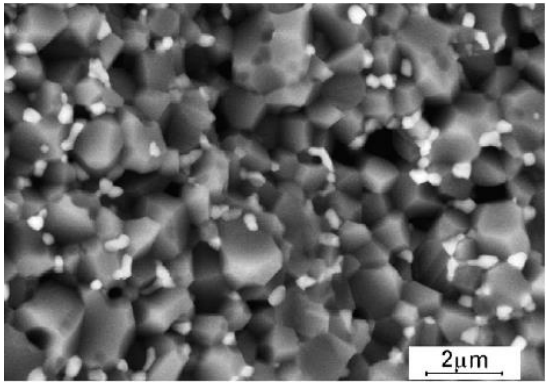
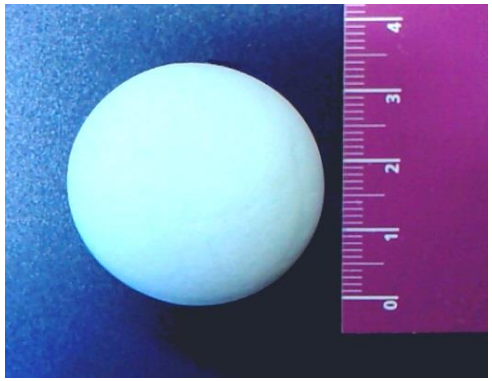
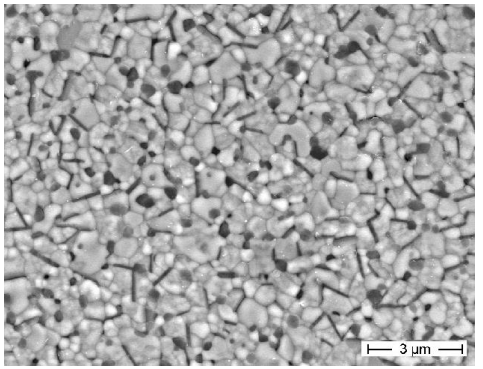
# Development of dense materials for orthopedic and dental applications

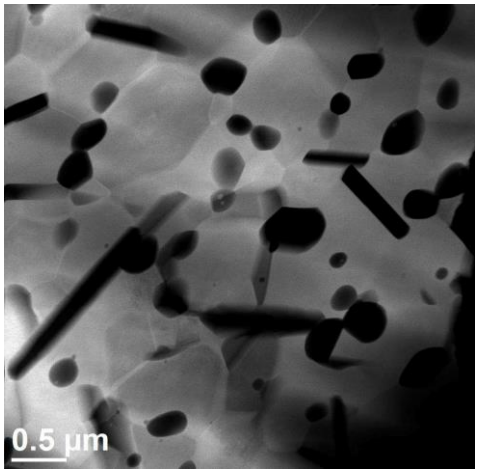


**Alumina-Zirconia for femoral head prototype. Composite powders prepared by the surface coating method, where alumina particles are functionalized by inorganic precursors of the second phase. Whole process carried out in water.**

**Zirconia-based composites for dental applications: materials developed in the frame of "LONGLIFE" EU Project**




**Italian Patent TO1014A000145**

# POLITO-LINCE

## FACILITIES

## Raw materials synthesis

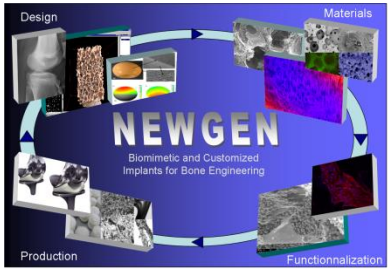
- Powders and gels; monolithic and composite materials; hybrid materials (polymer-ceramic composite materials);
- Surface modification of commercial HAp/TCP powders (Si-, Mg-, Sr-substituted powders);
- Sol-gel coating, spin coating; EPD technology;
- New geopolymer-based biomaterials for scaffolds and drug delivery
- Magnetic oxides and particles

## Forming

- Pressing, slip casting, gel casting, tape casting, spray drying;

## Sintering

- Pressureless sintering up to very high T
- Laser sintering (collaboration with IIT@POLITO)

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## Characterizations:

- **Physical:** Density, Porosity, Specific Surface Area; Granulometry;
- **Thermal**: Simoultanoeus Thermogravimetric Analysis (TG-DTA); differential and uniaxial dilatometer; Thermal conductivity (laser flash);
- **Microstructural/compositional** : SEM; FESEM equipped with EDX microanalysis; XPS, ICP-OES;
- **Mechanical**: Hardness, Fracture toughness, tensile, flexural and compressive strength;