



➤ **Complete denomination:**

”Group for biomineralization and biocomposite systems”, Ruđer Bošković Institute

➤ **Location (city, country):** Zagreb, Croatia

➤ **Director:** Tomo Antičić

➤ **Contact person in NEWGEN:** Maja Dutour Sikirić, Damir Kralj, Darija Jurašin

➤ **Working Group involvment:** WG1 and WG3

➤ **Staff:** 10 staff (4 scientist, 5 Res Assistants, 1 technician)

➤ **Research topics:**

- mechanisms and kinetics of precipitation processes of biologically important sparingly soluble salts (calcium phosphates, calcium carbonates), interactions with the additives
- industrial crystalization
- biomimetic bone substitute materials
- selfassembly processes in systems containing surfactants
- application of electron paramagnetic resonance spectroscopy

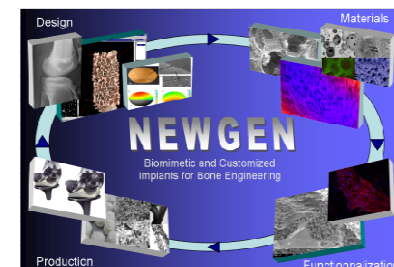
➤ **Researchers expertises:**

- interactions at organic-inorganic interfaces
- design and synthesis of novel materials
- basic and advanced physico-chemical characterization methods



**GBBS**

Ruđer Bošković Institute  
Bijenička cesta 54  
10000 Zagreb- CROATIA



**COST Action MP1301**

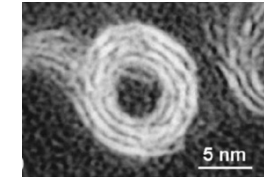
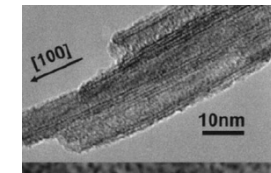
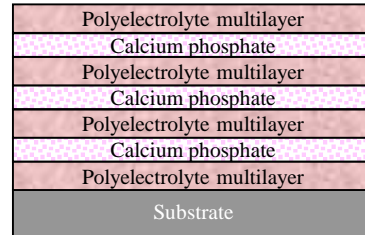
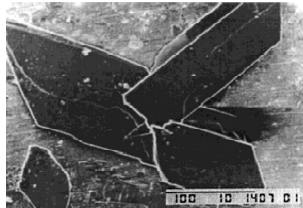


**Controlling morphology and phase composition with additives**

**Organic-inorganic composites coatings**

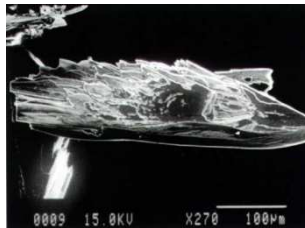
**Inorganic - inorganic composites**

**calcium phosphate dihydrate, DCPD**

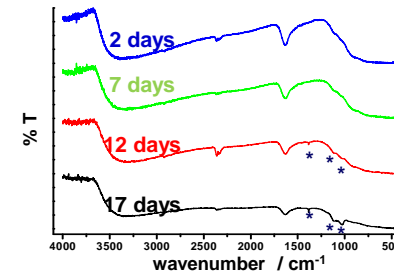
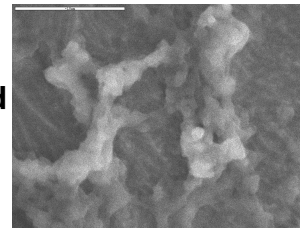


**TiO<sub>2</sub> nanotubes**

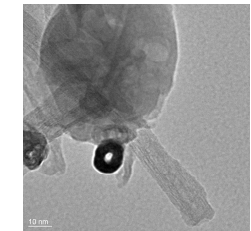
**in the presence of pAsp**



**ACP based coating**

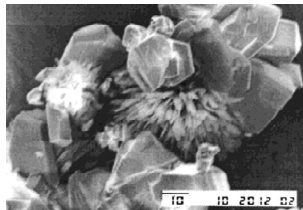


**Induction experiment**

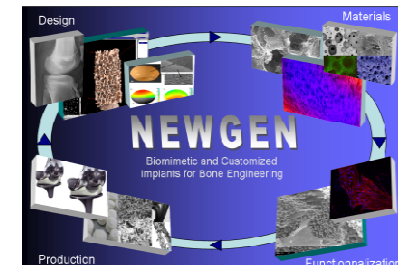
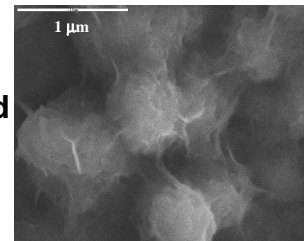


**Influence on the morphology**

**in the presence of the surfactant SDS**



**OCP based coating**

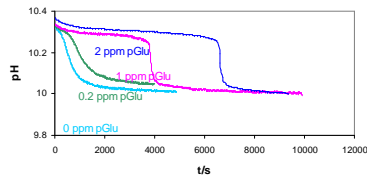


**COST Action MP1301**

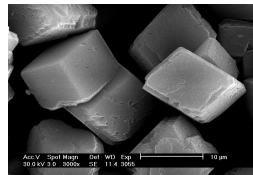


## Combined approach - precipitation kinetics and structural analysis

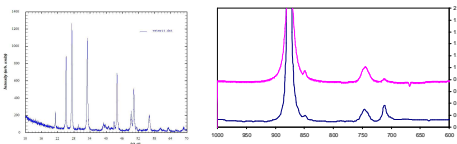
- Potentiometry / kinetics



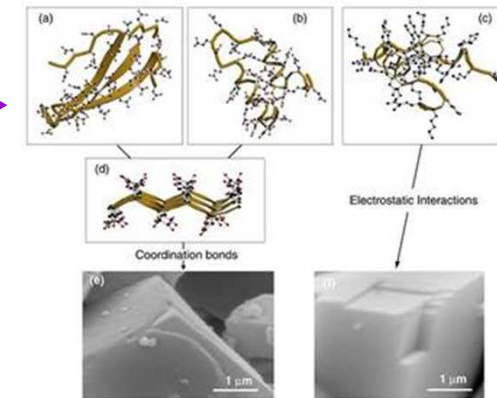
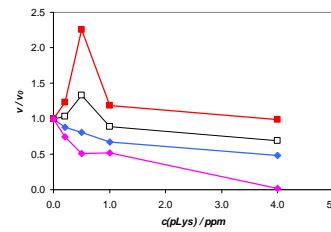
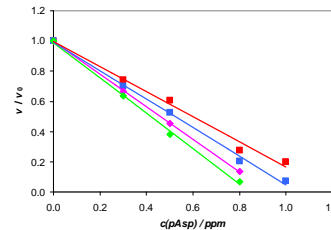
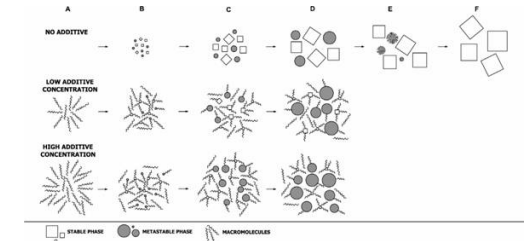
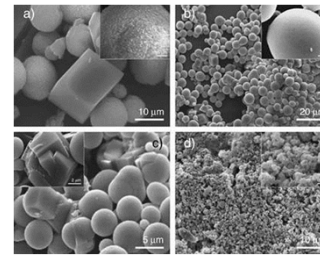
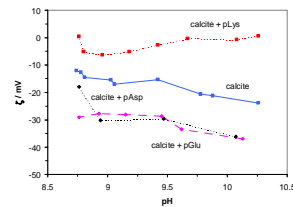
- SEM / morphology



- XRD, FTIR / structure

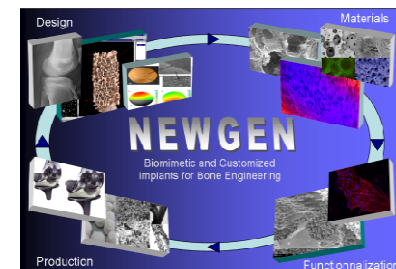


- Electroforetic mobility



- Models of interaction

- Growth kinetics models



COST Action MP1301

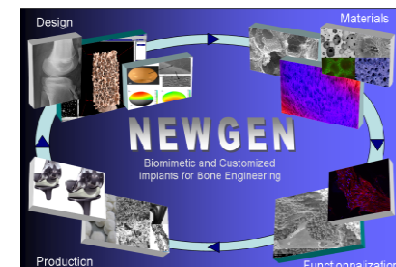


### Precipitated calcium carbonate

- homemade multifunctional computer controlled bench scale chemical reactor **Viker**
- precise control of all process parameters



- final product with desired physico-chemical characteristics (mineral structure, crystals size distribution, crystal morphology,...)

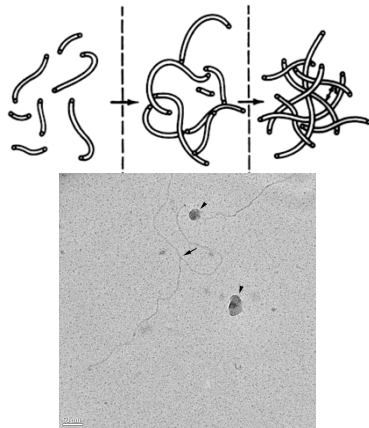
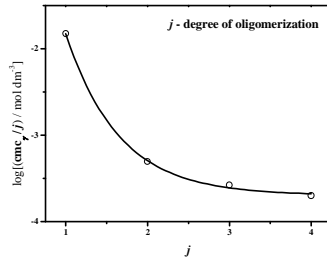
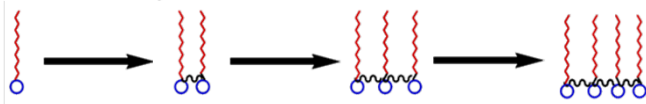






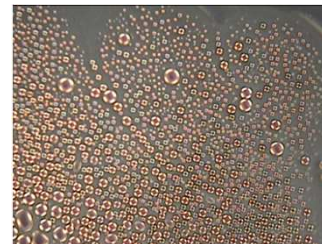
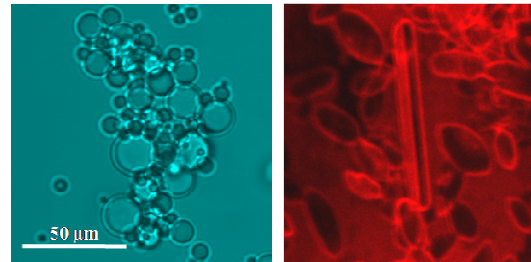
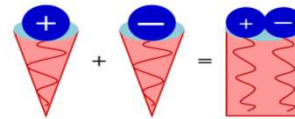
### Solution

- design and physico-chemical characterization of novel surfactants



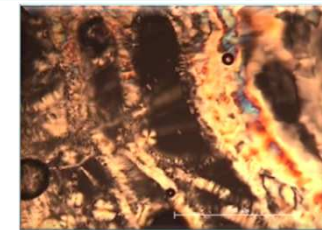
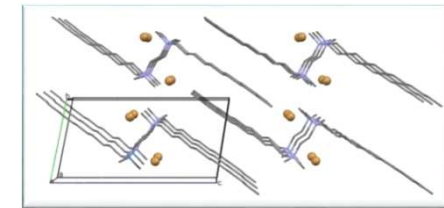
### Catanionic mixtures

- physico-chemical characterization of mixtures of oppositely charged I surfactants

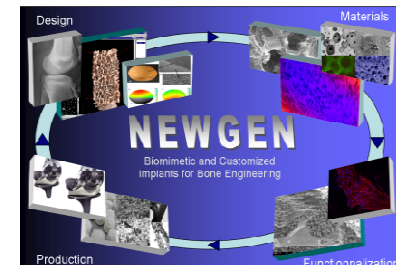


### Solid state

- thermal behaviour of surfactants in solid state



↑ T

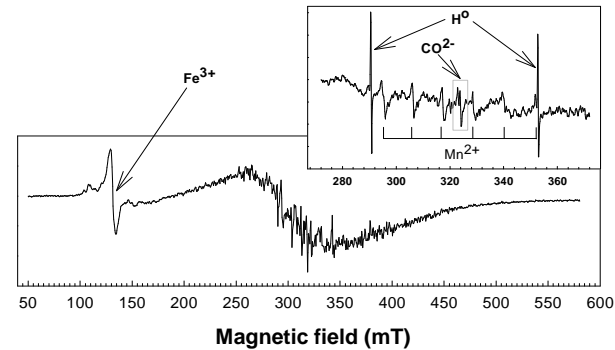


**COST Action MP1301**



**Characterisation of materials**

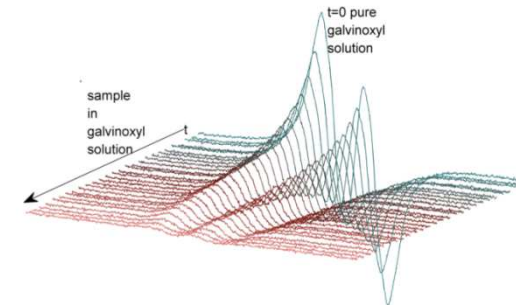
- identification of free radicals, metal ions, impurities, radiation induced radicals....
- structural determination.....



ANTIOXIDATIVE ACTIVITY

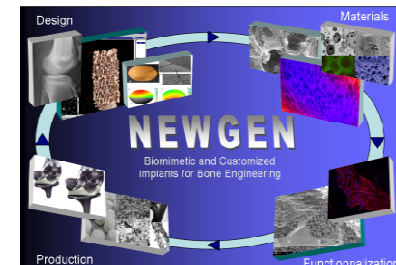
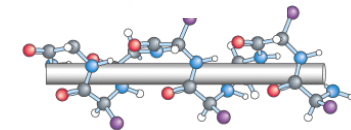
**Reaction studies**

- kinetics, monitoring catalytic processes, ROS.....
- activity of enzymes...



**Functional studies**

- activation and transport of drugs
- protein structure and dynamics



**COST Action MP1301**



### Materials characterization

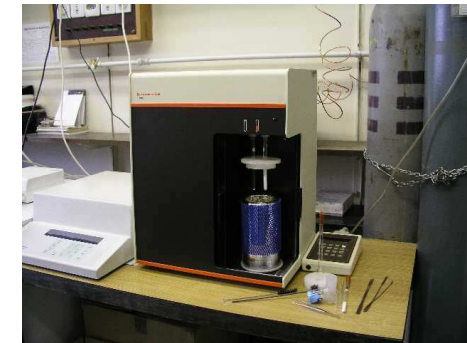
- Spectroscopy – EPR, UV-VIS, FTIR
- Microscopy – optical microscopes (with hot stage), fluorescent microscope
- Particle size analysis - characterization of nano and micron sized particles
- Specific surface area analyzer & porosimeter
- Thermal analysis
- Ion chromatography



EPR spektrometer Bruker FT-EPR 580 Elexsys  
 Continous wave and pulse mode 1- and 2-D  
 measurements, temperature range 4-370K



Zetasizer Nano ZS, Malvern  
 Particle size distribution and zeta potential



Gemini 2380, Micromeritics  
 Specific surface area and pore size distribution

