

JSI-Nano / Saša Novak

GENERAL PRESENTATION

- ✓ **Complete denomination:** Jožef Stefan Institute, Dept. for Nanostructured Materials
- ✓ **Location (city, country):** Ljubljana, Slovenia
- ✓ **Director:** prof. Jadran Lenarčič
- ✓ **Contact person in NEWGEN:** Saša Novak
- ✓ **Working Group involvement:** WG1, WG2
- ✓ **Staff:** dr. Nataša Drnovšek, dr. Martina Lorenzetti, Ana Gantar (PhD candidate), Rok Koce (PhD candidate)
- ✓ **Research topics:** fabrication of composite scaffolds; bioactive coatings for titanium implants
- ✓ **Researchers expertises:** colloidal processing, composites

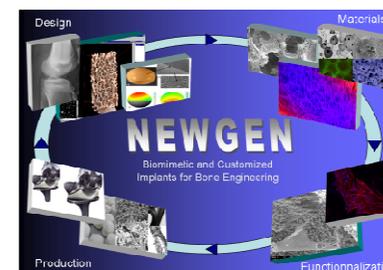


Saša Novak / JSI

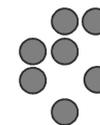
Jožef Stefan Institute

Jamova c. 39

SI-1000, Ljubljana - SLOVENIA

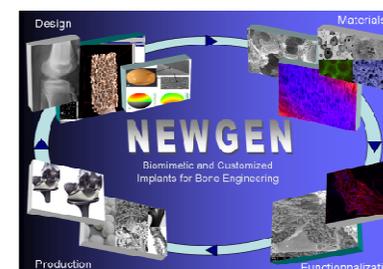
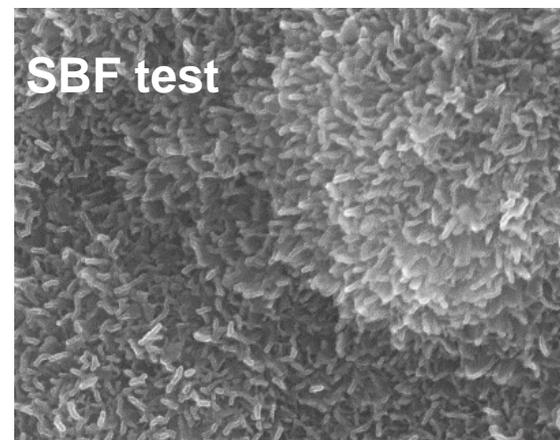
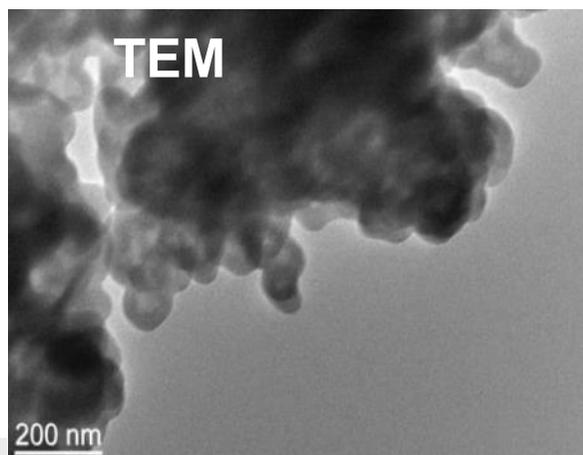
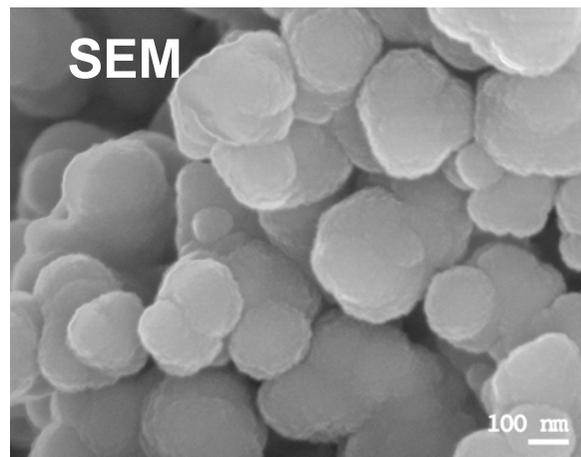


COST Action MP1301

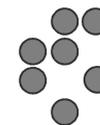


Synthesis of Bioactive Glass (BAG)

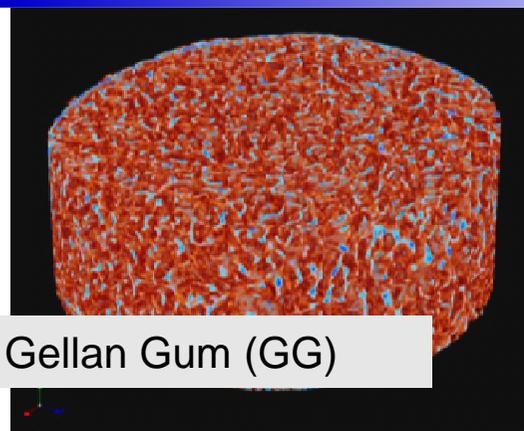
Sol-gel precipitation → nanometric amorphous particles (~200 nm)



COST Action MP1301



BAG-reinforced biocomposites

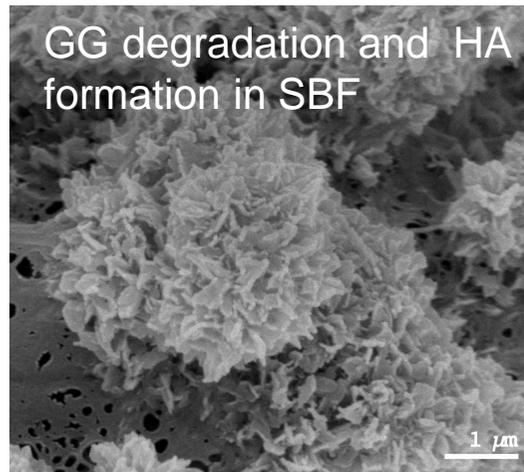


BAG-reinforced Gellan Gum (GG)

Wetting angle: 20°
Pore size: 100-300 μm

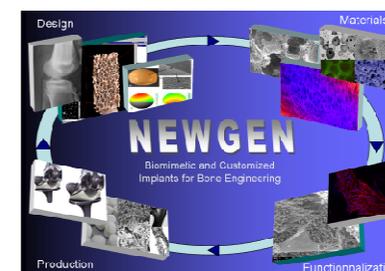


Hydrogel after
freeze drying



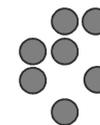
GG degradation and HA
formation in SBF

A. Gantar, L. P. da Silva, J. M. Oliveira, A. P. Marques, V. M. Correlo, S. Novak, R. L. Reis, Gellan gum: Nanoparticulate Bioactive –Glass-Reinforced Gellan Gum Hydrogels, *Materials science & engineering. C*, 2014, 27-36

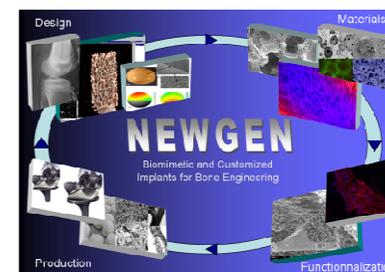
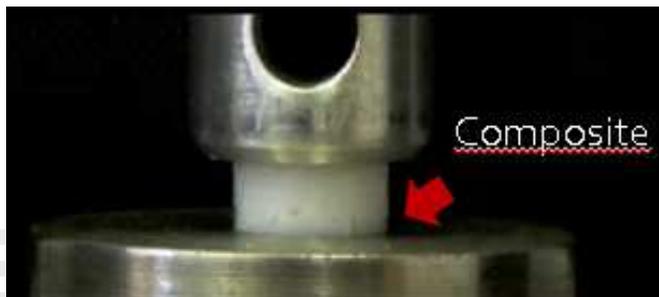
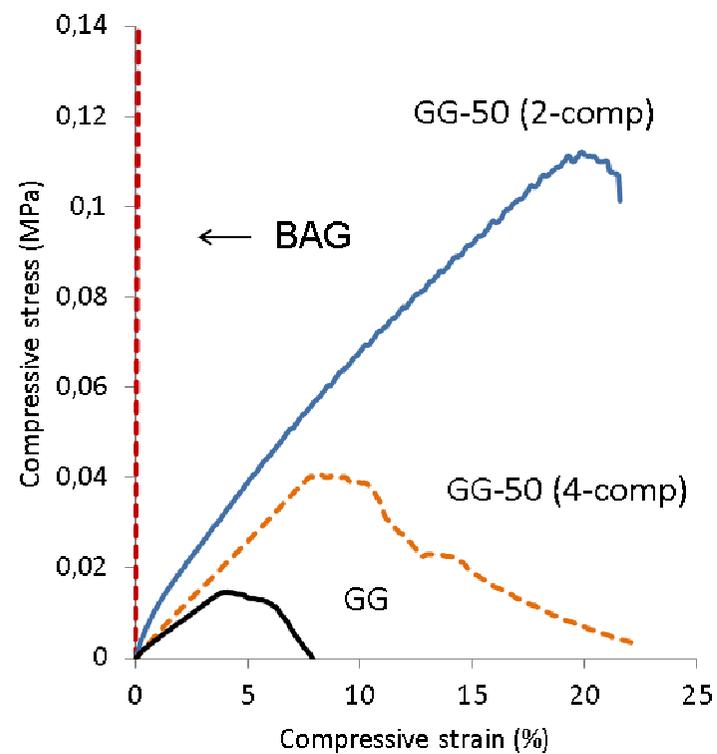
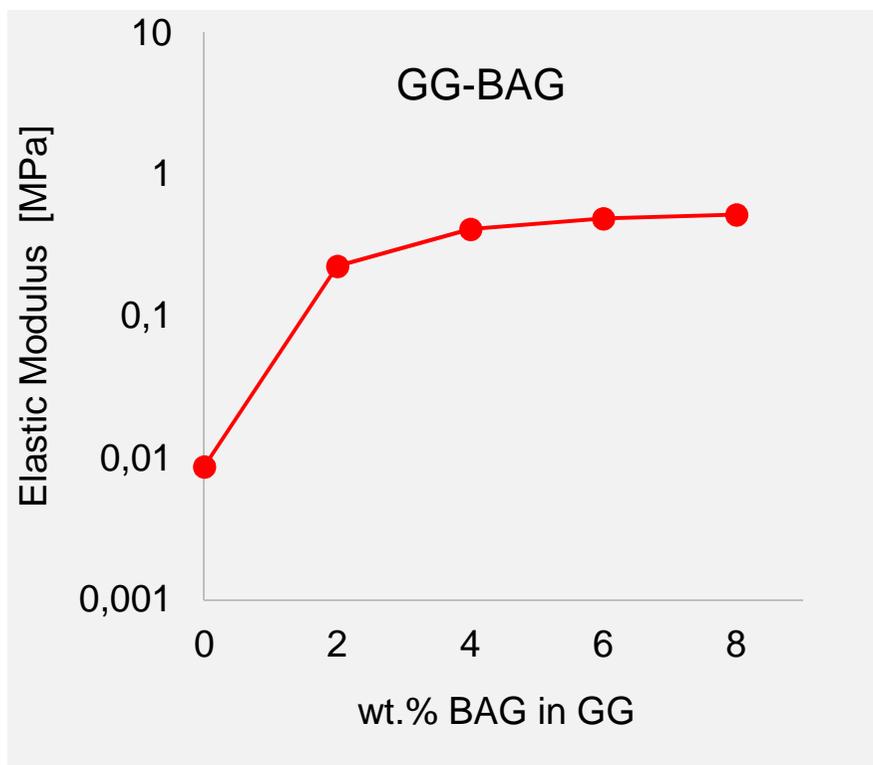


COST Action MP1301

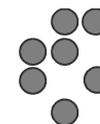




BAG-reinforced biocomposites: mechanical properties

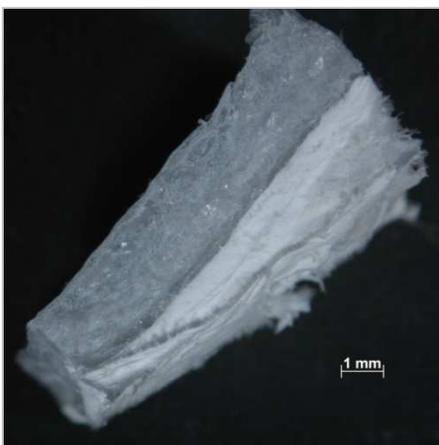
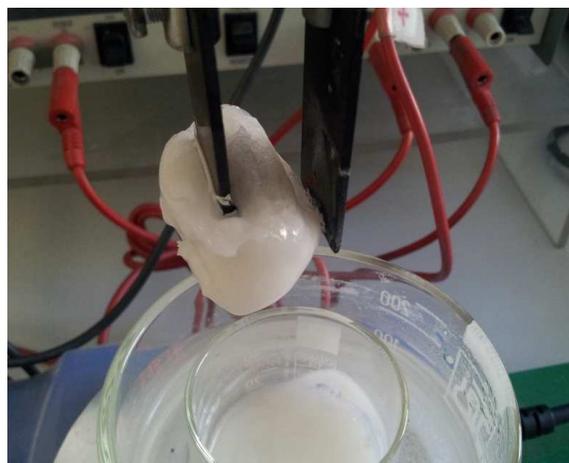
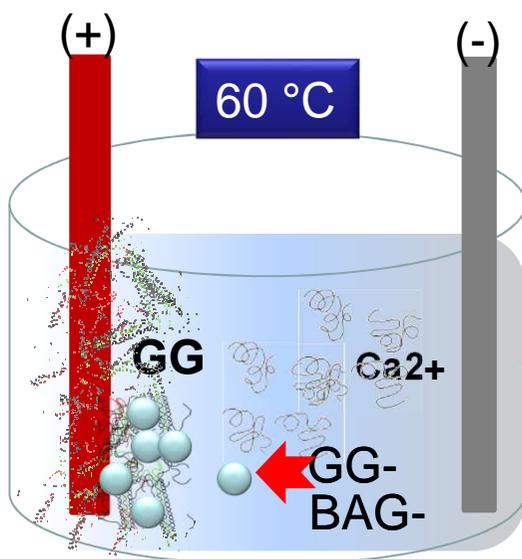


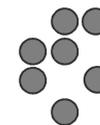
COST Action MP1301



Scaffolds with gradient composition GG..(GG+BAG)

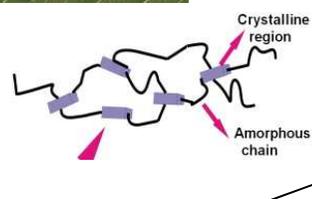
Electrophoretic deposition: 7V/cm, 10 min





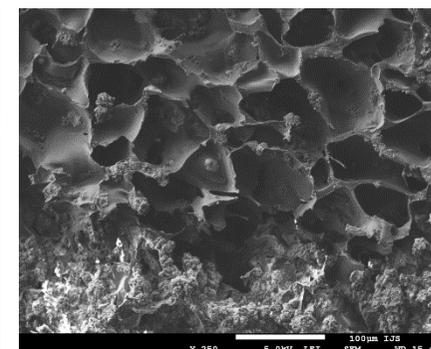
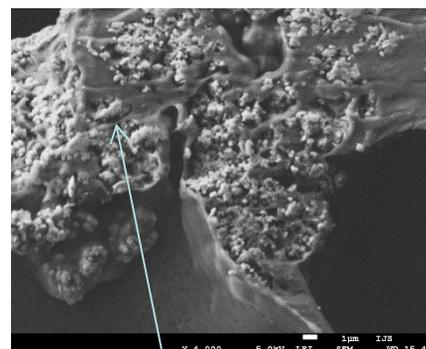
Ca-enriched and BAG-reinforced silk-fibroin based scaffolds

Silk Fibroin

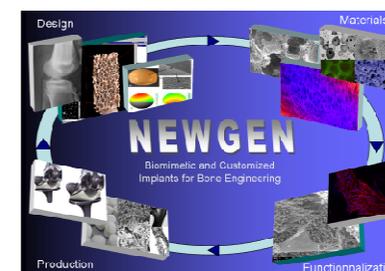


BAG-reach layer

Fibroin-BAG nanocomposite

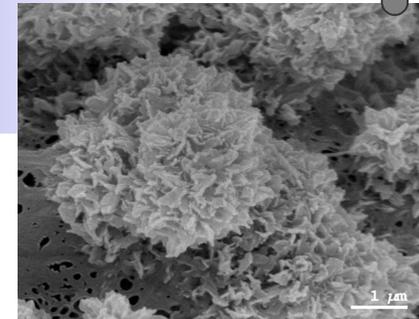
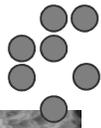


Dr. Nataša DRNOVŠEK



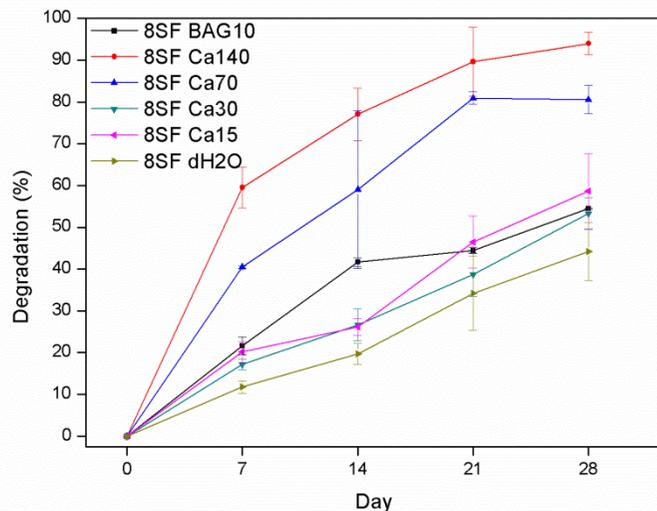
COST Action MP1301

Biodegradation of the scaffolds

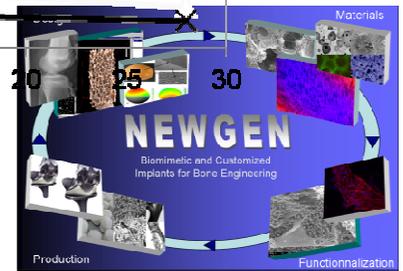
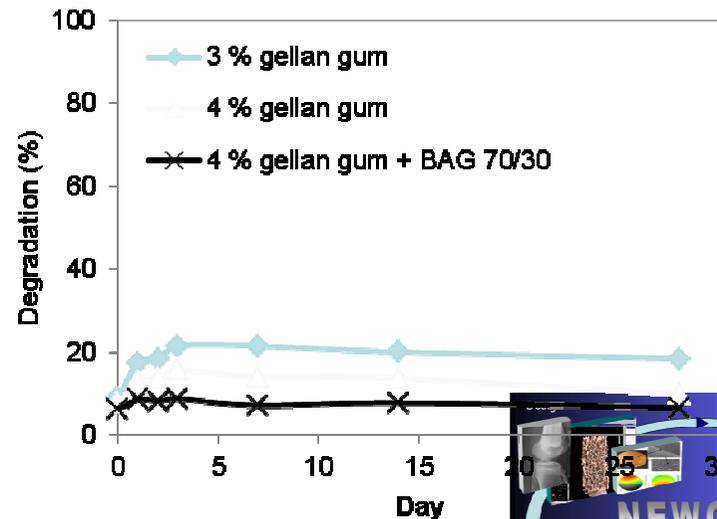


- Complete degradation
- Degradation rate tailored by chemical composition
- pH decrease due to degradation of biopolymers compensated for the pH increase by BAG dissolution (release of Ca-ions)

Silk fibroin with BAG

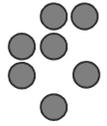


GG-BAG



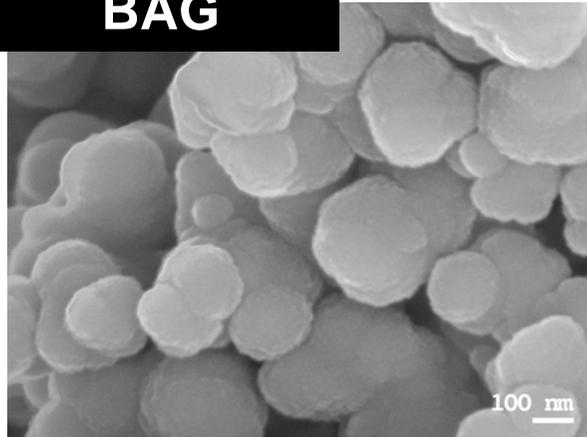
COST Action MP1301



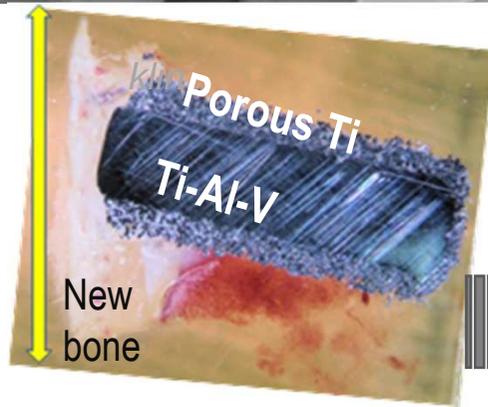
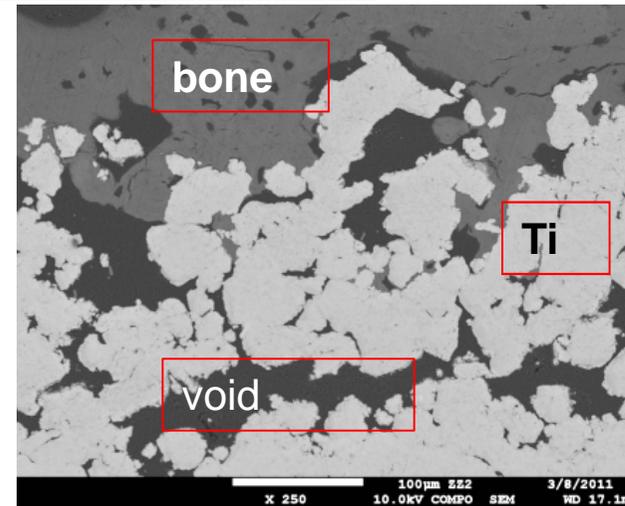


Nanoparticulate bioactive glass filler in porous titanium

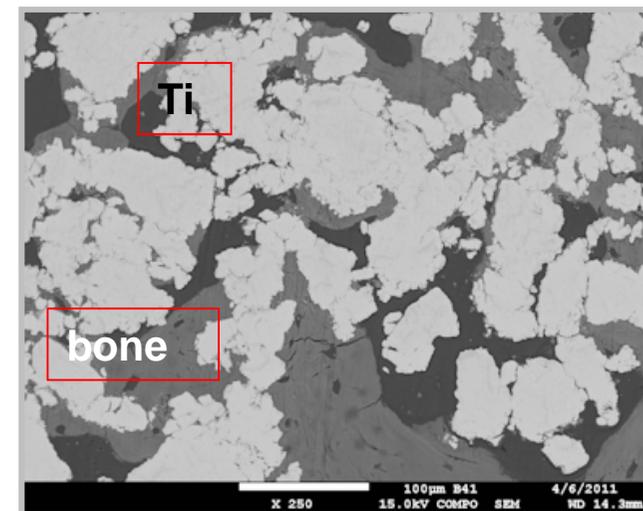
BAG



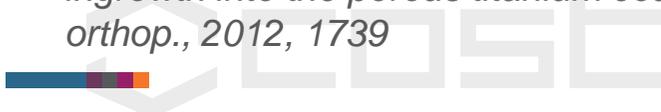
In vivo: 10 weeks

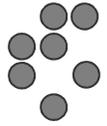


With BAG
Quick bone formation



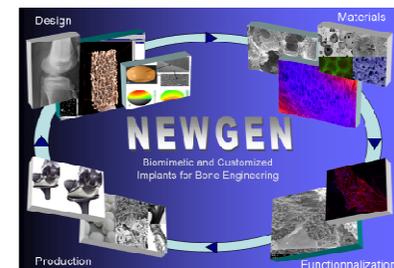
N. Drnovšek, S. Novak, et al, Bioactive glass enhances bone ingrowth into the porous titanium coating on orthopaedic implants. Int. orthop., 2012, 1739





FACILITIES

- Equipment for controlled sol-gel synthesis
- Homogenisers
- High-T furnaces
- Refrigerators
- Autoclaves
- Zeta-meters
- Particle sizers
- Optical and electron microscopes
- ...



COST Action MP1301