

FTM/Faculty of Technology and Metallurgy

GENERAL PRESENTATION

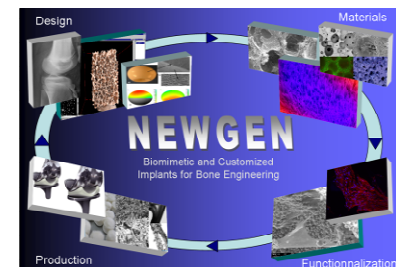


- ✓ **Complete denomination:** Faculty of Technology and Metallurgy, University of Belgrade
- ✓ **Location (city, country):** Belgrade, Serbia
- ✓ **Dean:** Prof. Dr Djordje Janackovic
- ✓ **Contact person in NEWGEN:** Prof. Dr Bojana Obradovic
- ✓ **Working Group involvement:** WG4
- ✓ **Staff:** Dr Jasmina Stojkovska, Jovana Zvicer, Mina Jovanovic, Dr Djordje Veljovic, Andrea Osmokrovic
- ✓ **Research topics:** biomimetic bioreactors, skeletal tissue engineering, nanocomposite hydrogels
- ✓ **Researchers expertises:** bioreactor design and operation, biomaterial evaluation under biomimetic conditions



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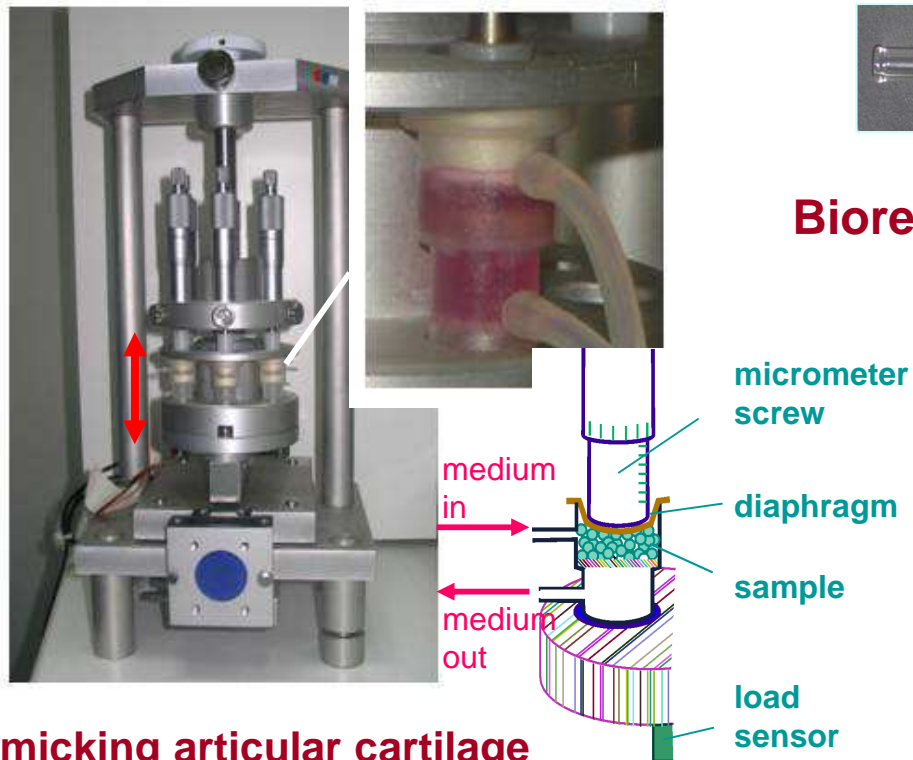
Faculty of Technology and Metallurgy
University of Belgrade
Karnegijeva 4
11000 Belgrade - SERBIA



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BIOMIMETIC BIOREACTORS

Bioreactor with dynamic compression



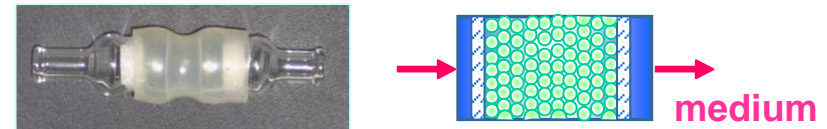
Biomimicking articular cartilage

perfusion: 10 – 100 $\mu\text{m/s}$

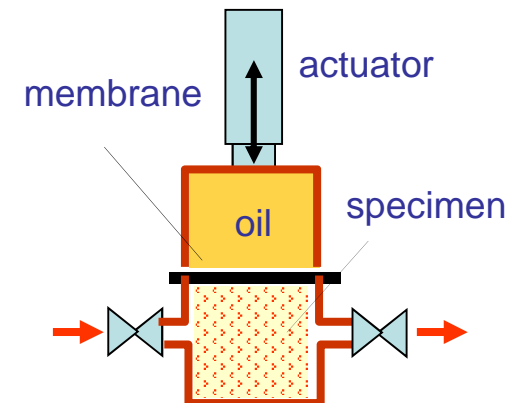
dynamic compression:

337.5 $\mu\text{m/s}$, 0.1 - 1 Hz, 5-10 % strain

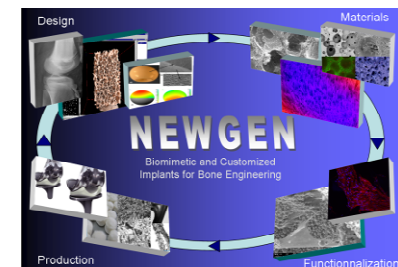
Perfusion bioreactors



Bioreactor with hydrostatic pressures



up to 30 bar; continuous perfusion

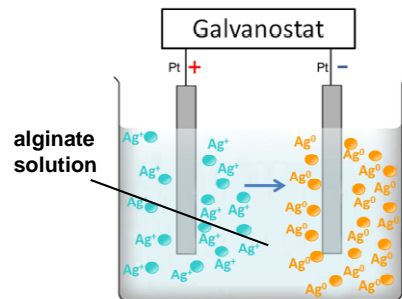


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Novel Ag/alginate nanocomposites

Production of novel Ag/alginate nanocomposites with incorporated silver nanoparticles (AgNPs)

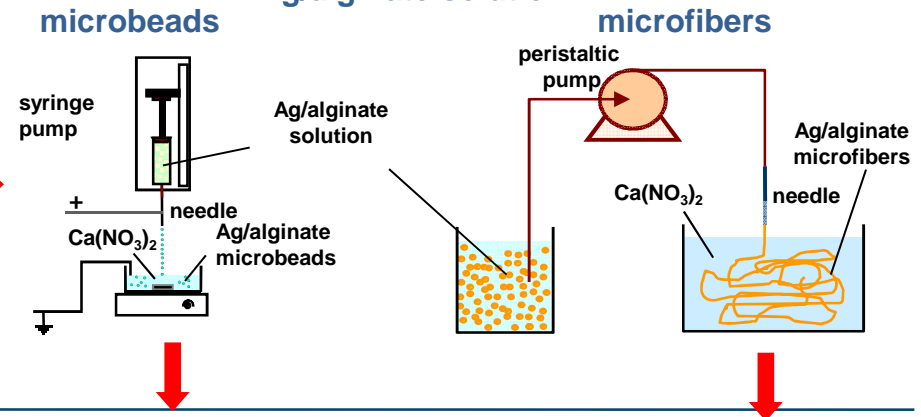
Electrochemical synthesis of AgNPs in alginate solution:



Hydrothermal synthesis of AgNPs in alginate solutions

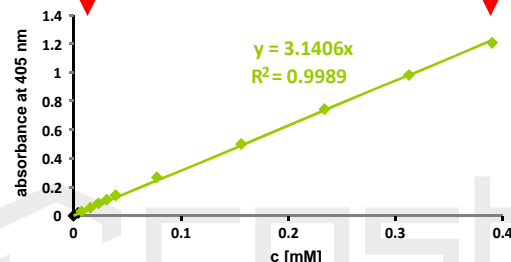
AgNP synthesis by chemical reduction in alginate/honey solutions

Production of Ag/alginate hydrogels starting from the Ag/alginate solution:

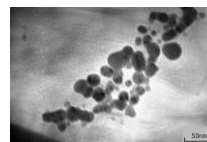


Novel Ag/alginate nanocomposites

Ag/alginate solutions with controlled AgNPs: concentration

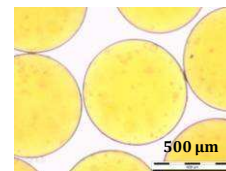


size

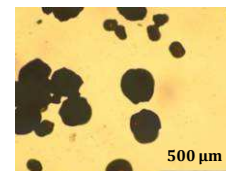


TEM image

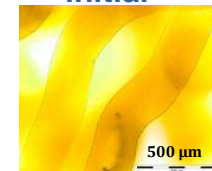
Ag/alginate microbeads initial



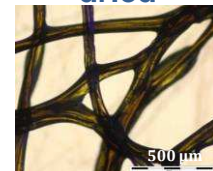
dried



Ag/alginate microfibers initial

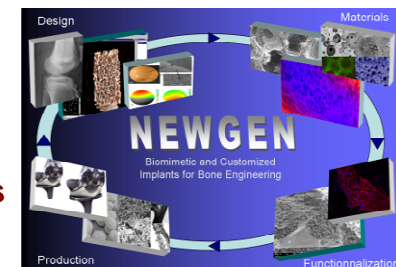


dried

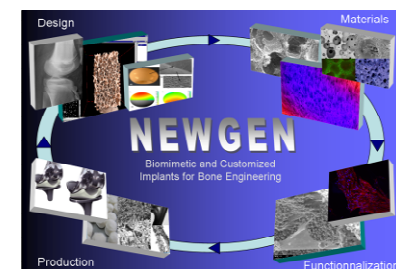
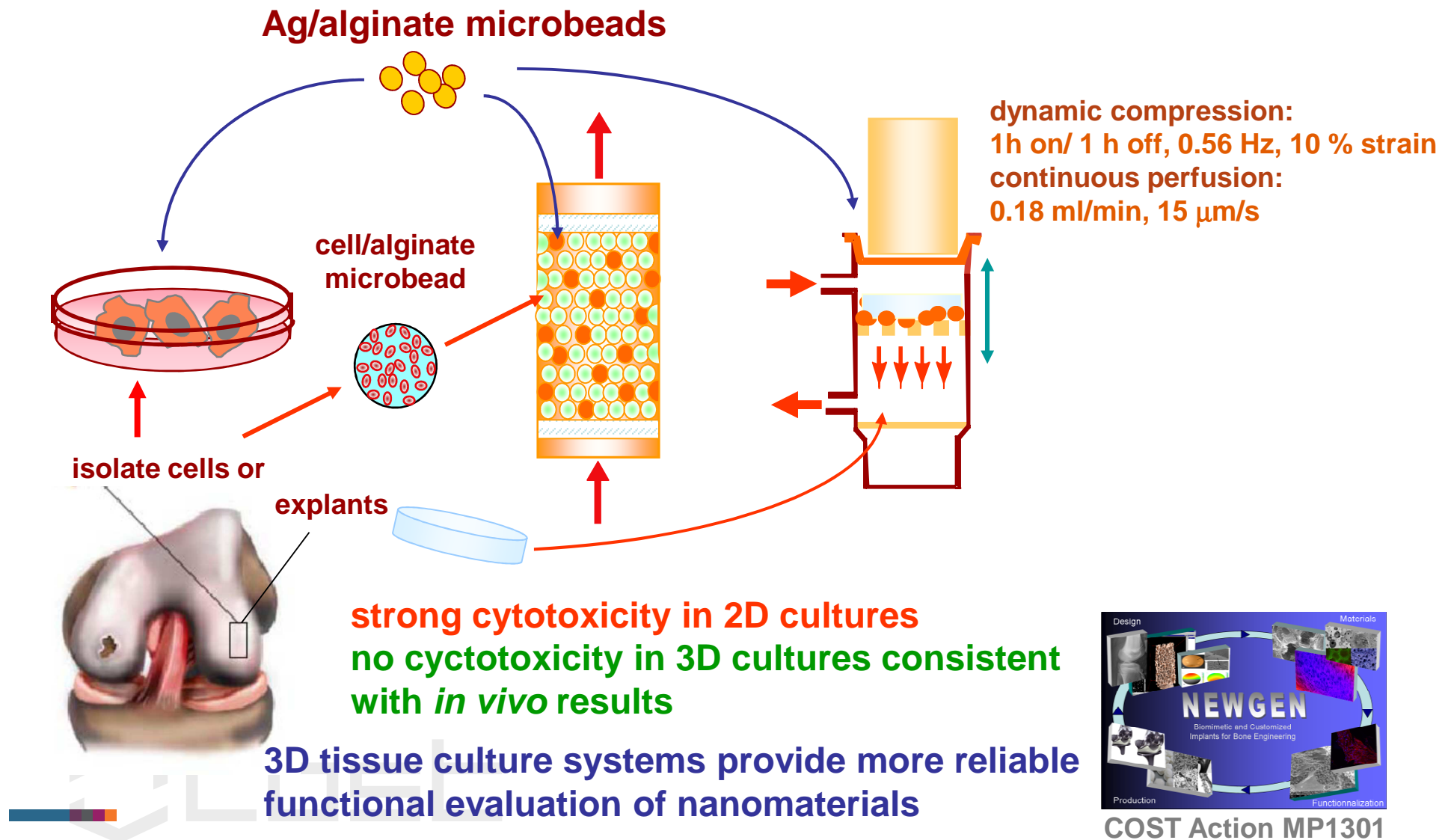


Bioreactor studies:

- biomechanical characterization
- Ag release
- cell-biomaterial interactions
- performance under biomimetic conditions

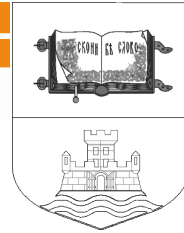


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CHARACTERIZATION OF GELLAN-GUM HYDROGELS REINFORCED WITH BIOACTIVE-GLASS



In collaboration with dr Sasa Novak, Jozef Stefan Institute, Slovenia

Hydroxyapatite formation in 2 % w/w gellan-gum discs with 2 % w/w of bioactive-glass (composition: 70 % SiO₂, 30 % CaO) over 14 days of continuous perfusion of simulated body fluid

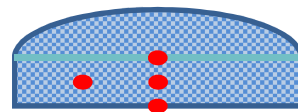


- ✓ Flow rate 1.13 ml/min
- ✓ SBF exchange every 48 h
- ✓ 37 °C

initial

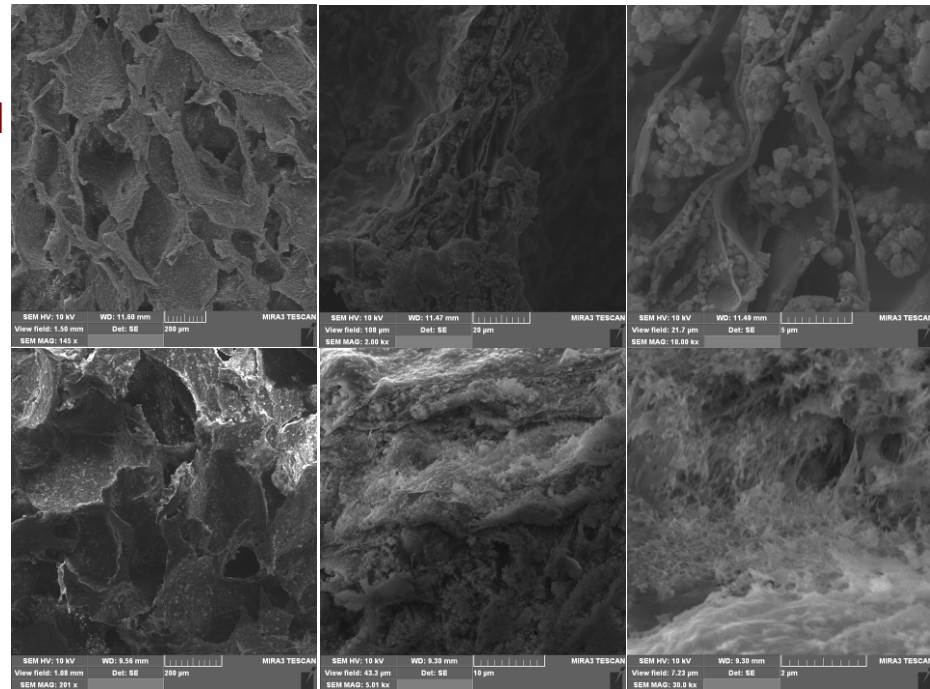
14 d

RAMAN apectroscopy: characteristic pick for HAp1 at ~960 nm was obtained in all checked spots

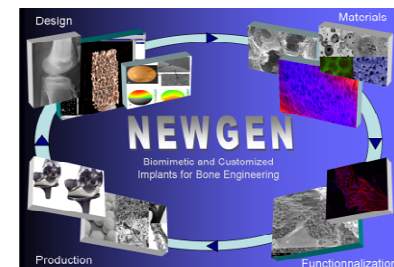


sample cross-section

FEG-SEM



Zvicer J., Gantar A., Veljovic Dj., Novak S., Obradovic B., Evaluation of nano-particulate bioactive-glass reinforced gellan-gum hydrogel regarding the formation of hydroxyapatite under shear stress, Seventeenth Annual Conference YUCOMAT 2015, 31.08- 4.09, 2015, Herceg Novi, Montenegro, Programme & The Book of Abstracts, p. 87



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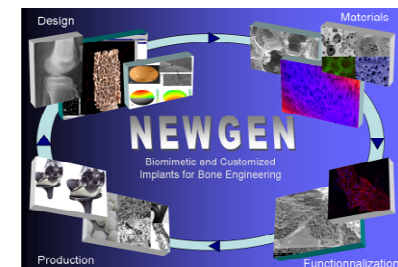
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FACILITIES



Laboratory for animal cell cultivation:
biohazard laminar hood, CO₂ incubator, microscopes, biomimetic bioreactors

Biomaterial characterization:
UV-Vis spectroscopy, XRD, SEM, FTIR
antimicrobial activity



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