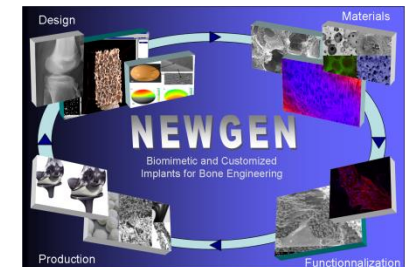




## GENERAL PRESENTATION

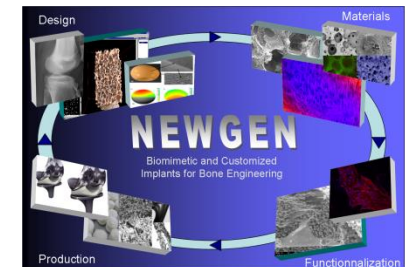
- **Complete denomination:** Centre of Polymer Systems (CPS) [<http://cps.utb.cz/eng/>]
- **Location (city, country):** Zlin, Czech Republic
- **Director:** Assoc. Prof. Vladimir Pavlinek
- **Contact person in NEWGEN:** Assoc. Prof. Nabanita Saha ([nabanita@ft.utb.cz](mailto:nabanita@ft.utb.cz)) /  
Dr. Nibedita Saha ([nibedita@uni.utb.cz](mailto:nibedita@uni.utb.cz))
- **Working Group involvment:** W1 and W2
  - WG2 :** Manufacturing and characterization of 3D – porous scaffolds (e.g. **Hydrogel**)
  - WG1 :** Design and synthesis of raw materials (e.g. **Bacterial cellulose**)
- **Staff:** Assoc. Prof. Nabanita Saha (PI), Dr. Oyunchimej Zandraa, Dr. Lenka Jelinkova, Dr. Nibedita Saha,  
Prof. Takeshi Kitano, Prof. Petr Saha and Ms. Rushita Shah (PhD student), Mr. Radek Vyroubal (PhD student)
- **Research topics:**
  - **Hydrogel** for wound dressings **or** transdermal drug delivery **or** food packaging **or** biomineralization
  - **Biogenic Gel** for bone / skin / dental treatment
  - **Calcium rich polymeric scaffolds** and **Biosynthesis of bacterial cellulose**
- **Researchers expertises:** Gel & Hydrogel preparation and characterization, Cytotoxicity assay, Microbiological assay, Polymer processing and characterization, Rheological & Mechanical property measurement, Bacterial Cellulose biosynthesis etc.





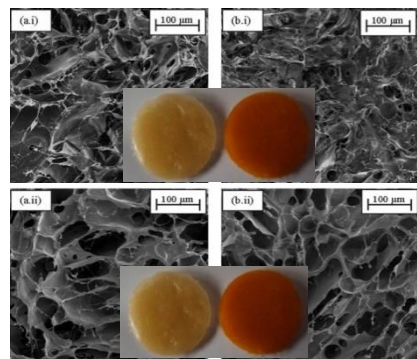
## BIOMATERIALS/NEWGEN TOPICS

- i) Scaffolds will be designed with inter-connected porosity in which osteogenic and angiogenic agents are incorporated/added.
- ii) Bioresorbable scaffolds with controlled porosity and tailored properties will be prepared using advance technologies.
- iii) Attention will be given for the preparation of slower degrading and faster degrading polymeric scaffold.
- iv) Scaffold materials, their geometry, pore size distribution, and ability to release biomolecules at desired rate will be investigated.
- v) Toughness as well as reliable and reproducible manufacturing techniques for calcium rich biomineralized polymeric scaffolds will be studied.
- vi) Hydrogel and /or Bacterial cellulose will be used as an extra-cellular matrix for biomimetic mineralization with a higher and lower concentration of calcium ion. The effect of polymer concentration, the molecular weight of the polymer and initial calcium ion concentration will also be studied.

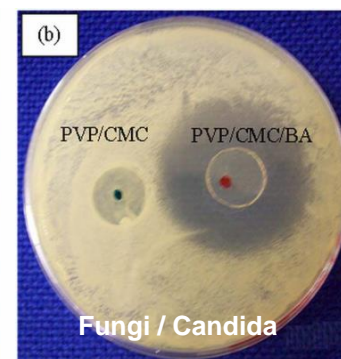
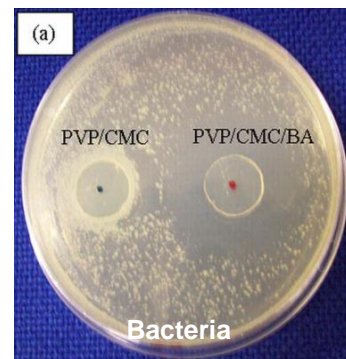




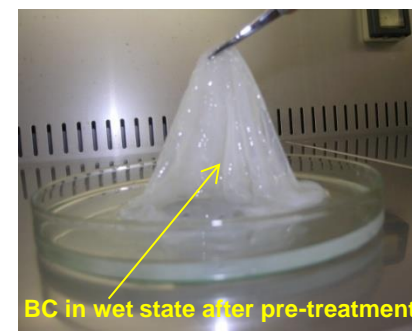
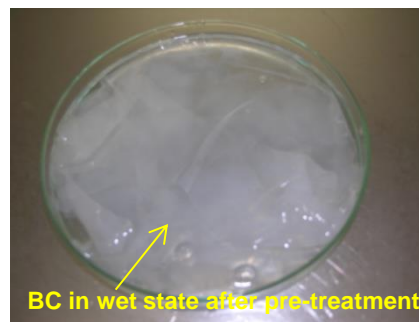
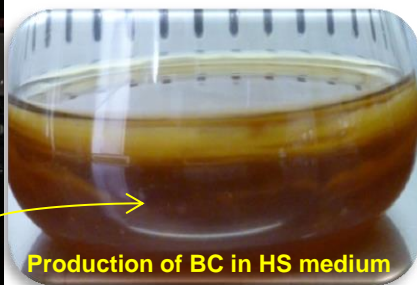
### Biomaterial research activities at CPS, TBU in Zlin



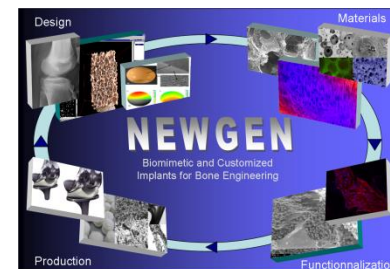
Hydrogel as wound dressing and transdermal drug delivery



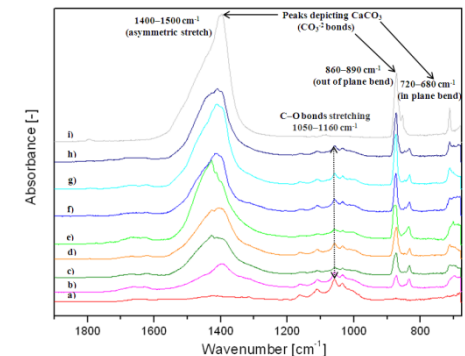
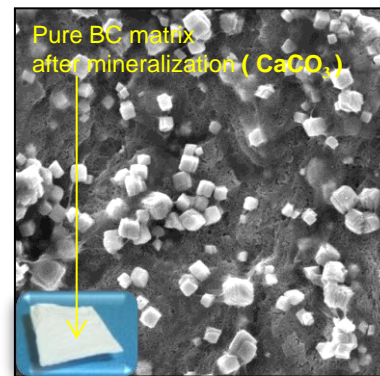
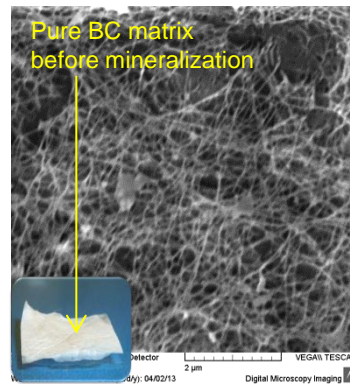
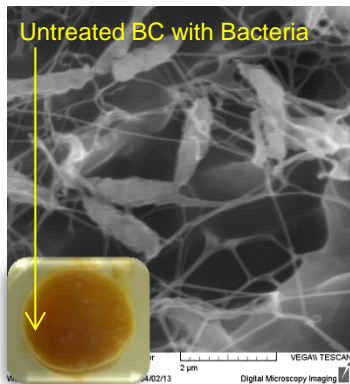
Antimicrobial assay of hydrogel



Biosynthesis of Bacterial Cellulose (BC): a renewable biopolymer for medical applications



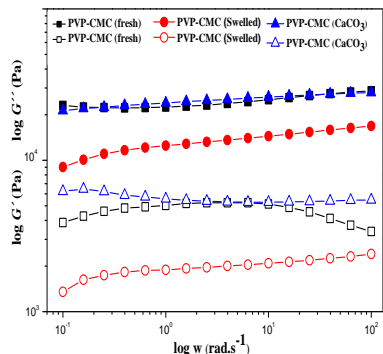




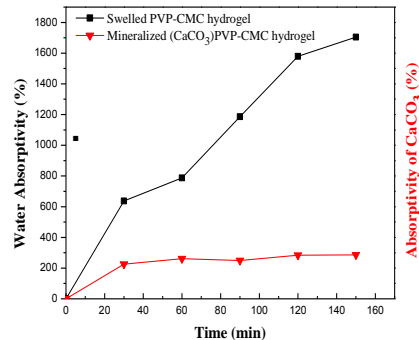
ATR FT-IR spectra of pure bacterial cellulose (a), BC-CaCO<sub>3</sub> 1, 5, 10, 20, 30, 40, 60 min (b-h) and pure CaCO<sub>3</sub> (i)

### Bacterial cellulose (BC) as a matrix for biomineralization to prepare calcite filled innovative biomaterials

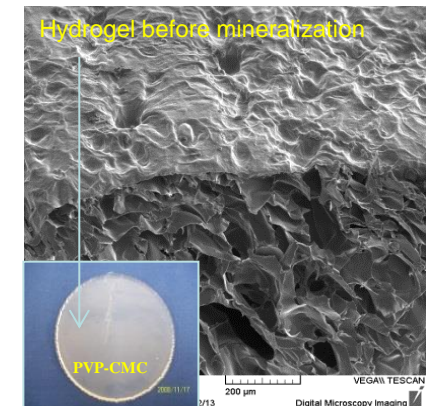
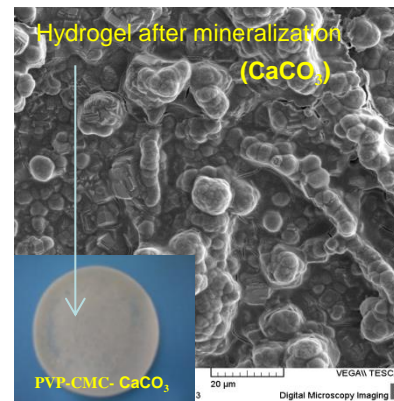
Ref. Vyroubal, R., Saha, N. et al. [Current Opinion in Biotechnology Volume 24, Supplement 1, July 2013, Pages S109, European Biotechnology Congress 2013](#)



Effect of angular frequency ( $\omega$ ) at 1% strain on storage modulus ( $G'$ , filled symbol) and loss modulus ( $G''$ , non filled symbol) for fresh, swelled and mineralized (CaCO<sub>3</sub>) PVP-CMC hydrogel.



Absorption behavior of PVP-CMC hydrogel in presence of water and mineral solutions of calcium chloride and sodium carbonate



### Hydrogel as a matrix for biomineralization to prepare calcite filled innovative biomaterials

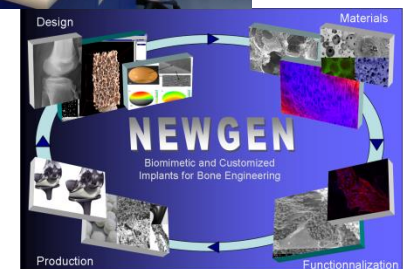
Ref: Shah, R, Saha N. et al. [Journal of Applied Polymer Science](#), Volume 131, Issue 10, 15 May 2014.



## FACILITIES



## Facilities for biomaterial work and their characterization

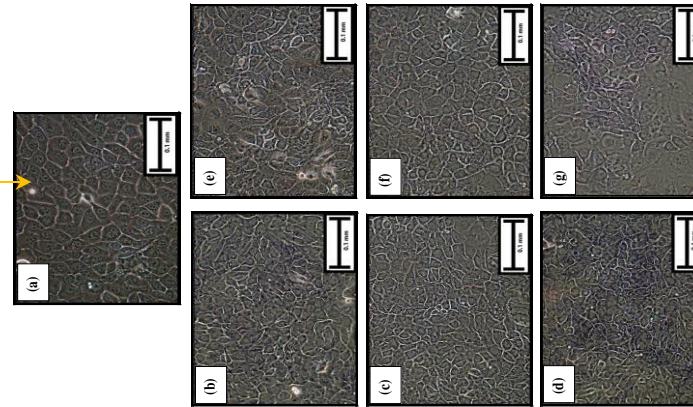
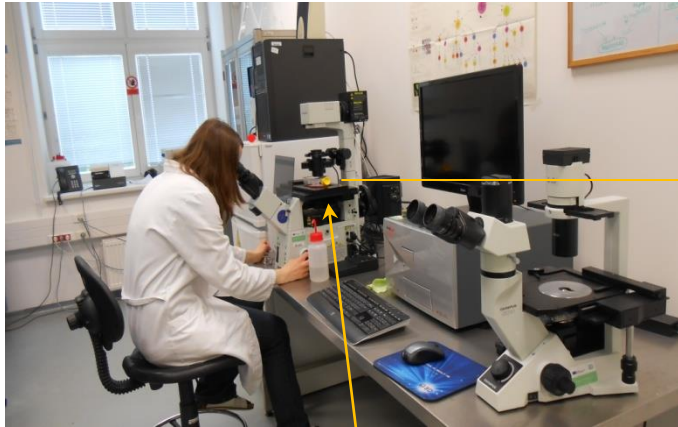




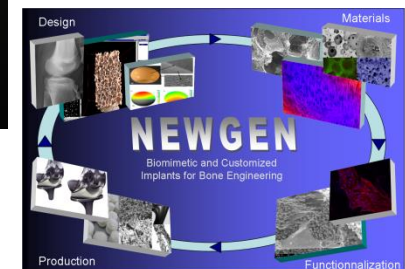
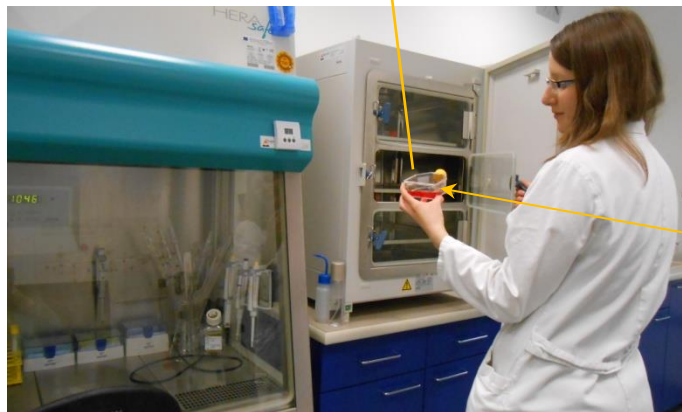


## FACILITIES

### Facilities for cell culture and characterization



Optical micrograph of human skin (HaCaT) cell growth after 24 hour cultivation in absence and presence of hydrogels extract: (a) control (b) PVP-CMC 10% (c) PVP-CMC 50% (d) PVP-CMC 100% (e) PVP-CMC-BA 10% (f) PVP-CMC-BA 50% (g) PVP-CMC-BA 100%





## FACILITIES

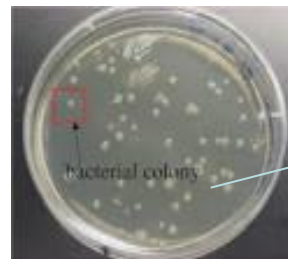
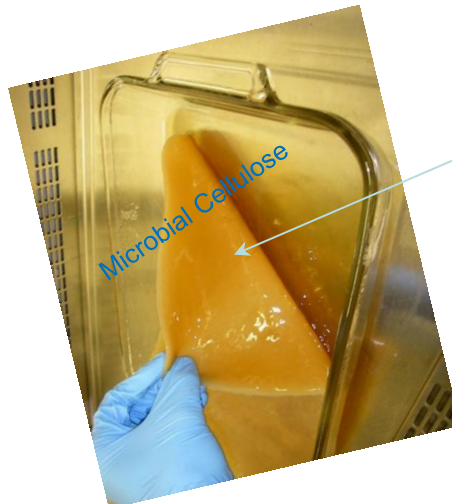
### Facilities for Microbiological work and characterization



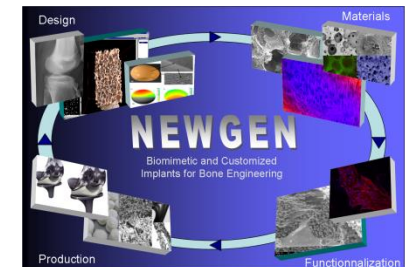
Medium preparation and sterilization Lab



Aseptic chamber for microbiological work



Bacterial colony counting







## FACILITIES



Preparation of bioactive material (Gel)



Clean laboratories for medical applications



Regarding availability of equipment facilities at CPS,  
Please visit the following link.

<http://cps.utb.cz/eng/index.php/pistrojove-vybaveni>

