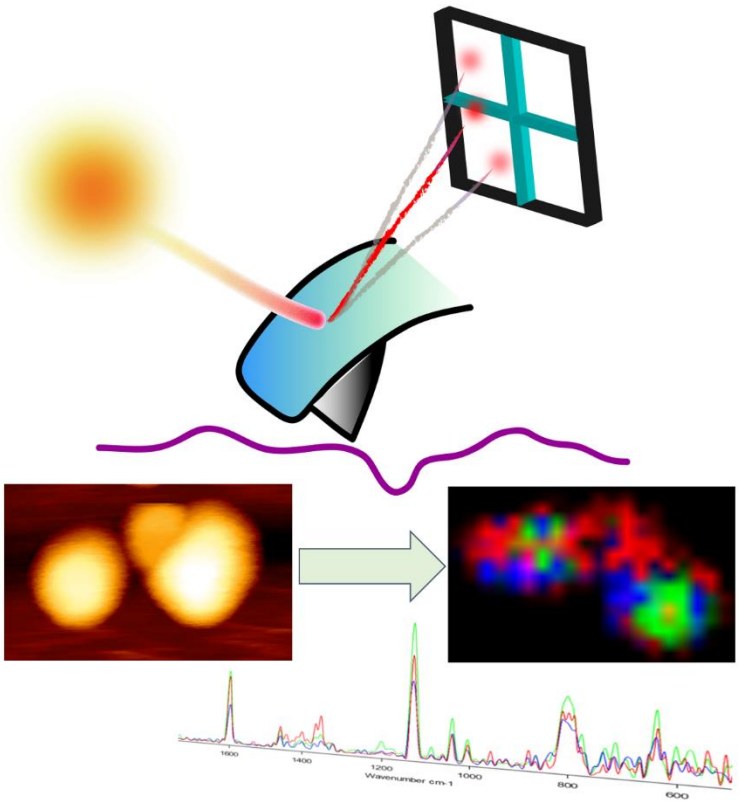
2018 Annual Summary

Institute for Biophysics



Department of Nanobiotechnology

University of Natural Resources and Life Sciences Vienna

2018 ANNUAL SUMMARY: INSTITUTE FOR BIOPHYSICS (DNBT-BOKU VIENNA)

1. Foreword

2018. No annual report but annual summary this time. From now on we will have bi-annual reports. This has advantages and disadvantages. We might lose track on short projects but the reports will scientifically sound better.

2018 has been the best year so far in quantitative terms. Short: 21 articles (I did not count accepted ones that might appear in 2019) and 20 contributions to conferences (workshops and seminars). A week point still remains: we do not supervise enough BSc and MSc students when compared with BOKU average (e.g. Erasmus or external students do not count for the negotiations with the Ministry). This has something to do without lack of teaching in bachelor (something I would like to improve in the years to come). The third-party money is still healthy (e.g. the new FWF project of Dietmar Pum).

The large number of SCI papers (in the last five years) dealing with biophysics, biomaterials and physical chemistry means that new topics are already established at the institute. For example, Notburga Gierlinger has already established a trademark at BOKU concerning the (molecular) study of wood by spectroscopic methods, and Jagoba Iturri advances in his characterization of soft materials (e.g. cells) by surface sensitive techniques.

During 2018, we have been about "34" people between members and visitors. But more impressive for me is the number of students who were performing experiments in our labs: 11 PhD, 5 MSc and 2 BSc. Among them, 8 came from abroad (or other Austrian institutions) to work with us. This is a success taking into account that our web page is not even actualized either with our expertise or with "modern" projects.

A pleasant experience was to have Klemen Bohinc from the University of Ljubljana (Slovenia), who delivered two lectures connecting Monte Carlo simulations with the interactions of charged particles in aqueous media.

I like having visitors around. Therefore, we will continue to invite (with pleasure) researches and students from other countries.

At scientific and social level, as usual, we still: i) manage laboratories that are constantly used by DNBT coworkers and "external" researches, ii) participate in BOKU commissions concerning leadership, teaching, research and ethical matters (DLK, DokStuko, FachStuko, Forschungsprecher, ethics platform) and iii) help with the DNBT X-mas party. I will need to continue doing bureaucracy (not X-mas party) until the end of 2021 (since I have been re-elected as Head of Department).

2019 will be a challenging year due to the 2019-2021 "Ziekvereinbarung" period. Issues concerning the place of DNBT research topics at BOKU and our role in building a new teaching study program will be the focus of department politics (since they have been asked by the new Rectorate). I hope to tell you more next year.

Thank you for making this possible. I wish all the best to the coworkers who left the institute to continue a professional career somewhere else (here we are to continue to help and mentor them). Finally, I would like to remember Iris Strube, our second *Lehrling* who after two years with us, decided to go to university to study. I wish her lots of luck and hard working.

Thank you (and good night).

José L. Toca-Herrera

PD: Dieter asked me (last February) about the Biophysics Summer School. Such "party" is important to get to know each other and to discuss science (it gives me a global picture of what is going on). September is a bad month for me. Maybe, winter school would be more appropriate. We will see.

2. Institute members and visitors – 2018

- Univ. Prof. Dr. José L. Toca-Herrera (director)
- Ao. Univ. Prof. Dr. Dietmar Pum (deputy director, group leader)
- Assoc. Prof. Dr. Notburga Gierlinger (group leader)
- Assoc. Prof. Dr. Stefano Leporatti (CNR, Italy)
- Assoc. Prof. Dr. Klemen Bohinc (Ljubljana University, Slovenia, CEEPUS program)
- O. Univ. Prof. em. Uwe B. Sleytr (emeritus, former director)
- Dr. Andreas Breitwieser (post-doctoral research assistant)
- Dr. Jagoba J. Iturri (univ. assistant)
- Dr. Itziar Otazo (tech. assistant)
- Dr. Sudarat Tharad (univ. assistant)
- Dr. Med. Michael Handler (PhD student, collaboration with Sports Univ. Innsbruck, Austria)
- Mag. Amsatou Andorfer-Sarr (techn. assistant)
- MMSc. Sebastian Antreich (PhD student)
- MSc. Peter Bock (PhD student)
- MSc. Martin Feldhofer (PhD student)
- Mag. Jacqueline Friedmann (tech. assistant)
- MSc Andreas Weber (PhD student)
- MSc. Alberto Moreno-Cencerrado (PhD student)
- MSc. Batirtze Prats Mateu (PhD student)
- MSc Eva Sanchez (PhD student, collaboration with University of the Basque Country, Spain)
- MSc. Nadia Sasani (PhD student)
- MSc. Maria Sumarokova (PhD student, Erasmus Mundus Iamonet Program)
- MSc Carmen Teixeira (PhD student, collaboration with Lincoln University, New Zealand)
- MSc Öyku Üzulmez (PhD student, collaboration with MedUni-Vienna, Austria)
- MSc. Nannan Xiao (PhD student)
- BSc. Alice Buytaert (MSc-Erasmus student, Gent University, Belgien)
- BSc. Leif Löher (MSc Erasmus student, TU-Berlin, Germany)
- BSc. Konrad Mayer (MSc student)
- BSc. Piet Mitjen (MSc-Erasmus student, Gent University, Belgien)
- BSc. Christoph Pötscher (MSc student)
- BSc. Charlotte Verlinde (MSc-Erasmus student, Gent University, Belgien)
- BSc. Magdalena Hübner (MSc Student, BOKU / MedUni Wien)
- Iris Strube (apprentice)
- Magda Spöcker (Schülerin, Talente-Stipendium)

3. Articles and book chapters

Publications (SCI)

- Felhofer M, Prats-Mateu B, Bock P, Gierlinger N. Antifungal stilbene impregnation: transport and distribution on the micron-level. Tree physiology, 38 (2018) 1526-1537
- Niedermeir M, Gierlinger N, Lütz-Meindl U. Biomineralization of strontium and barium contributes to detoxification in the freshwater alga Micrasterias. J Plant Physiol. 230 (2018) 80-91
- Prats-Mateu B, Bock P, Schroffenegger M, Toca-Herrera JL, Gierlinger N. Following laser induced changes of plant phenylpropanoids by Raman microscopy. Scientific reports 8 (2018) 11804
- Prats-Mateu B, Felhofer M, de Juan A, Gierlinger N. Multivariate unmixing approaches on Raman images of plant cell walls: new insights or overinterpretation of results? Plant methods 14 (2018) 52
- Gierlinger N. New insights into plant cell walls by vibrational microspectroscopy. Applied Spectroscopy Reviews 53 (2018) 517-551
- Huss JC, Spaeker O, Gierlinger N, Merrit DJ, Miller BP, Neinhuis C, Fratzl P, Eder M. Temperature-induced self-sealing capability of Banksia follicles. Journal of the Royal Society Interface 15 (2018) 143
- Rosner S, Gierlinger N, Klepsch M, Karlsson B, Evans R, Lundqvist SO, Svetlik J, Borja I, Dalsgaard L, Andreassen K, Jansen S. Hydraulic and mechanical dysfunction of Norway spruce sapwood due to extreme summer drought in Scandinavia, Forest Ecology and Management 409 (2018) 527-540
- Özparpucu M, Gierlinger N, Burgert I, VanAcker R, Vanholme R, Boerjan W, Pilate G, Dejardin A, Ruggeberg M. The effect of altered lignin composition on mechanical properties of CINNAMYL ALCOHOL DEHYDROGENASE (CAD) deficient poplars. Planta 247 (2018) 887-897
- Koehnke J, Rennhofer H, Lichtenegger H, Mahendran AR, Unterweger C, Prats-Mateu B, Gierlinger N, Mahler A-K, Potthast A, Gindl-Altmutter W. Electrically Conducting Carbon Microparticles by Direct Carbonization of Spent Wood Pulping Liquor. ACS Sustainable Chem. Eng. 6 (2018) 3385-3391
- Huss JC, Schoeppler V, Merrit DJ, Best Ch, Maire E, Adrien J, Spaeker O, Janssen N, Gladisch J, Gierlinger N, Miller BP, Fratzl P, Eder M. Climate-Dependent Heat-triggered Opening Mechanism of Banksia Seed Pods. Advanced Science 5 (2018) 1700572
- De Meester B, de Vries L, Özparpucu M, Gierlinger N, Corneillie S, Pallidis A, Goeminne G, Morreel K, De Bruyne M, De Rycke RM, Vanholme R, Boerjan WA. Vessel-specific reintroduction of CINNAMOYL COA REDUCTASE 1 (CCR1) in dwarfed ccr1 mutants restores vessel and xylary fiber integrity and increases biomass. Plant Physiol. 176 (2018) 611-633
- Iturri J, Breitwieser A, Pum D, Sleytr, UB, Toca-Herrera JL. Electrochemical-QCMD control over S-layer (SbpA) recrystallization with Fe2+ as specific ion for self-assembly induction. Appl. Sci. 8 (2018) 1460
- Terlecki-Zaniewicz L, Lämmermann I, Latreille J, Reddy Bobbili M, Pils V, Schosserer M, Weinmüllner R, Dellago H, Skalicky S, Pum D, Higareda Almaraz JC, Scheideler M, Morizot F, Hackl M, Gruber F, Grillari J. 2018. Small extracellular vesicles and their miRNA cargo are anti-apoptotic members of the senescence-associated secretory phenotype. Aging 10 (2018) 1103-1132
- Phan NVH, Sussitz HF, Ladenhauf E, Pum D, Lieberzeit PA. Combined layer/particle approaches in surface molecular imprinting of proteins: signal enhancement and competition. Sensors 18 (2018) 180
- Sumarokova M, Iturri J, Toca-Herrera JL. Adhesion, unfolding forces and molecular elasticity of fibronectin coatings: an atomic force microscopy study (paper awarded with the Cover of the journal). Microscopy Research and Technique 81 (2018) 38

- Ghorbani Gorji E, Waheed A, Ludwig R, Toca-Herrera JL, Schleining G, Ghorbani Gorji S. Complex Coacervation of Milk Proteins with Sodium Alginate. Journal of Agricultural and Food Chemistry 66 (2018) 3210
- Sanchez E, Nir S, Sarasua JR, Iturri J, Toca-Herrera JL, Meaurio E, Reches M. Miscibility, Interactions and Antimicrobial Activity of Poly(ε-caprolactone)/Chloramphenicol Blends. European Polymer Journal 102 (2018) 30
- Moreno-Cencerrado A, Iturri J, Toca-Herrera JL. In-situ 2D bacterial crystal growth as a function of protein concentration: and atomic force microscopy study. Microscopy Research and Technique 81 (2018) 1095
- Sumarokova M, Iturri J, Weber A, Maares M, Keil C, Haase H, Toca-Herrera JL. Influencing the adhesion properties and wettability of mucin protein films by variation of the environmental pH. Scientific Reports 8 (2018) 9660
- Tharad S, Üzülmez Ö, Promdonkoy B, Toca-Herrera JL. Cholesterol increases lipid binding rate and changes binding behavior of Bacillus thuringiensis cytolytic protein. International Journal of Molecular Sciences 19 (2018) 3819
- Ortiz R, Aurrekoetxea-Rodríguez I, Rommel M, Quintana I, Vivanco M, Toca-Herrera JL. Laser-generation of topological cues on a transparent polymeric biomaterial to anchor stem cells, control adipocyte morphology and promote osteogenesis. Polymers 10 (2018) 1337

SCI Publications ahead of print

- Hogger (2018) E, Bauer K, Höllbacher E, **Gierlinger N**, Konnerth J, van Herwijnen HWG. Time-dependent ammonia emissions from fumed oak wood determined by micro-chamber/thermal extractor (μCTE) and FTIR-ATR spectroscopy. Holzforschung, doi: 10.1515/hf-2018-0042 (on-line July 2018)
- Kratzer B, Köhler C, Hofer S, Smole U, Trapin D, Iturri J, **Pum D**, Kienzl P, Elbe-Bürger A, Gattinger P, Mittermann I, Linhart B, Gadermaier G, Jahn-Schmid B, Neunkirchner A, Valenta R, Pickl WF. Prevention of allergy by virus-like nanoparticles (VNP) delivering shielded versions of major allergens in a humanized murine allergy model. Allergy, doi: 10.1111/all.13573 (on-line July 2018)
- Simon C, Lion C, Biot C, **Gierlinger N**, Hawkins S. Lignification and Advances in Lignin Imaging in Plant Cell Walls. Annual plant Reviews, doi: 10.1002/9781119312994.apr0656 (on-line Nov. 2018)
- Weiss AV, Fischer T, Iturri J, Benitez R, **Toca-Herrera JL**, Schneider M. Mechanical Properties of Gelatin Nanoparticles in Dependency of Crosslinking Time and Storage. Colloids and Surfaces B, doi: 10.1016/j.colsurfb.2018.12.005 (on-line Dec 2018)
- **Toca-Herrera JL**. Atomic force microscopy meets biophysics, bioengineering, chemistry and materials science. ChemSusChem, doi: 10.1002/cssc.201802383 (on-line Dec 2018)

Non-SCI publications

- Bolós VJ, Benítez R, Eleta-López A, **Toca-Herrera JL**. A probabilistic model for crystal growth applied to protein deposition at the microscale. arXiv:1802.05045 [physics.bio-ph]
- Ortiz R, Moreno-Flores S, Quintana I, Vivanco MdM, Sarasua JR, **Toca-Herrera JL**. Laser induced topological cues shape, guide, and anchor human Mesenchymal Stem Cells. arXiv:1801.08635 [physics.bio-ph]

Books / Book chapters

- Sleytr, U.B. Breitwieser, A., Pum, D. Crystalline Cell Surface Layers (S-layers). Encyclopedia of Microbiology, 4th edition (in press)

4. Conferences, seminars, workshops and schools

AUTHOR: Xiao N, Bock P, and Gierlinger N
TITLE: Unravelling hierarchical microstructure and chemical changes of walnut shells
CONFERENCE: 22nd conference of the Austrian Society of Plant Biology (ATSPB)
PLACE, YEAR: Graz, Austria, 2018

AUTHOR: Sasani N, Prats-Mateu B, Paques L, Brendel O, Rosner S, Gierlinger N
TITLE: Impact of drought stress on the cell wall design of larch trees
CONFERENCE: 22nd conference of the Austrian Society of Plant Biology (ATSPB)
PLACE, YEAR: Graz, Austria, 2018

AUTHOR: Antreich JS, Xiao N, Gierlinger N
TITLE: Lignification of endocarp cells during the development of the walnut fruit
CONFERENCE: 22nd conference of the Austrian Society of Plant Biology (ATSPB)
PLACE, YEAR: Graz, Austria, 2018

AUTHOR: Antreich JS, Xiao N, Huss J, Gierlinger N
TITLE: Polylobate sclereid cells building up the shell of the walnut
CONFERENCE: 9. BIONIK-Kongress
PLACE, YEAR: Bremen, Germany, 2018

AUTHOR: Felhofer M, Bock P, Prats-Mateu B, Gierlinger N
TITLE: Following molecules in context with micro- and nanostructure and their changes upon laser irradiation
CONFERENCE: 1st Wood Nanotechnology Conference
PLACE, YEAR: Ascona, Switzerland, 2018

AUTHOR: Gierlinger N
TITLE: Raman imaging of plant cells: from pitfalls to success and from algae to wood
CONFERENCE: Confocal Correlative Raman Imaging Workshop
PLACE, YEAR: Stockholm, Sweden 2018

AUTHORS: Pum D, Toca-Herrera JL, Sleytr UB
TITLE: S-layer directed nanoscale fluid mechanics
CONFERENCE: Natural Materials and Systems Annual Review 2018
PLACE/YEAR: Niceville, Fl (USA), 3 – 8 Dec 2019

AUTHOR: Toca-Herrera JL
TITLE: Atomic force microscopy and its use on soft matter (oral)
CONFERENCE: Engineering responsive and biomimetic hydrogels for biomedical therapeutic and diagnostic applications (BIOGEL)
PLACE: Vienna (Austria), 2018

AUTHOR: Toca-Herrera JL
TITLE: Soft matter and atomic force microscopy: just a nice couple (oral)
CONFERENCE: International Conference on Catalysis and Surface Chemistry
PLACE: Krakow (Poland), 2018

AUTHOR: Sumarokova M, Iturri J, Toca-Herrera JL
TITLE: Adhesion, unfolding forces, and molecular elasticity of fibronectin coatings: An atomic force microscopy study (poster)
CONFERENCE: 8th Regional Biophysics Conference (RBC 2018)
PLACE: Zreče (Slovenia) 2018

AUTHOR: Weber A, Iturri J, Zemlic-Jokhadar S, Benitez R, Toca-Herrera JL
TITLE: Unravelling the role of microtubules on cytomechanics by nanoindentation (poster)
CONFERENCE: 8th Regional Biophysics Conference (RBC 2018)
PLACE: Zreče (Slovenia) 2018

AUTHOR: Zemljic Jokhadar S, Derganc J, Toca-Herrera JL, Iturri J
TITLE: The role of Arp2/3 complex in cytomechanics measured by AFM and optical tweezers (oral)
CONFERENCE: 8th Regional Biophysics Conference (RBC 2018)
PLACE: Zreče (Slovenia) 2018

AUTHOR: Iturri J, Sumarokova M, Weber A, Toca-Herrera JL
TITLE: Unravelling Mechanical Properties of Biopolymer Films by Means of Force Spectroscopy (oral)
CONFERENCE: 4th International Conference on Biomedical Polymers & Polymeric Biomaterials (ISBPPB 2018)
PLACE: Krakow (Poland) 2018

AUTHOR: Iturri J, Moreno-Cencerrado A, Toca-Herrera JL
TITLE: Tuning the antifouling activity of bacterial S-layers by means of controlled degradation (poster)
CONFERENCE: 32nd Conference of European Colloid and Interface Society (ECIS 2018)
PLACE: Ljubljana (Slovenia) 2018

AUTHOR: Iturri J, Lundgren A, van Oostrum P, Reimhult E, Toca-Herrera JL
TITLE: Gone fishing: Using Atomic Force Microscopy for a height dependent capture of bacterial fimbriae under specific and non-specific conditions (oral)
CONFERENCE: 32nd Conference of European Colloid and Interface Society (ECIS 2018)
PLACE: Ljubljana (Slovenia) 2018

AUTHOR: Weber A, Iturri J, Zemlic-Jokhadar S, Benitez R, Toca-Herrera JL
TITLE: Atomic Force Microscopy as Mechanical Tool to study cell mechanics (oral)
CONFERENCE: 14th Greta Pifat Mrzljak International School of Biophysics
PLACE: Split (Croatia) 2018

AUTHOR: Weber A, Iturri J, Benitez R, Toca-Herrera JL
TITLE: AFM as mechanical tool for (bio)material characterization (poster)
CONFERENCE: 14th Greta Pifat Mrzljak International School of Biophysics
PLACE: Split (Croatia) 2018

AUTHOR: Tharad S, Üzülmez Ö, Promdonkoy B, Toca-Herrera JL
TITLE: Effect of cholesterol on lipid binding behavior of Bacillus thuringiensis cytolytic protein Cyt2Aa2 (poster)
CONFERENCE: 10th ÖGMBT Annual Meeting
PLACE: Vienna (Austria) 2018

AUTHOR: Sumarokova M, Iturri J, Weber A, Tharad S, Moreno-Cencerrado A, Toca-Herrera JL
TITLE: Atomic Force Microscopy as imaging and mechanical tool (oral)
CONFERENCE: 10th ÖGMBT Annual Meeting
PLACE: Vienna (Austria) 2018

AUTHOR: Weber A, Iturri J, Benitez R, Vivanco MdM, Toca-Herrera JL
TITLE: Studying the effect of estrogen receptor-interacting substances on the mechanical and adhesive properties of human breast cancer cells via AFM (poster)
CONFERENCE: 10th ÖGMBT Annual Meeting
PLACE: Vienna (Austria) 2018

3. Ongoing projects, national and international collaborations, and student supervision

Accepted / Ongoing projects

- "S-layer directed nanoscale fluid mechanics", Air Force Office of Scientific Research (AFOSR), Agreement award FA9550-15-1-0459,
  Dietmar Pum (PI), Uwe B. Sleytr (Co-PI), and Jose-Luis Toca-Herrera (Co-PI)
- "Scattering and tapping on soft, hard, open nuts", ERC-consolidator grant SCATAPNUT, Notburga Gierlinger (PI)
- "Plant surfaces and Interfaces: Lignin, Suberin and Cutin", START-Project Y728-B16 SURFINPLANT (Austrian Science Fund, FWF), Notburga Gierlinger (PI)
- "Meteoriten Chemie und Vergleich mit Kometendaten von Rosetta", FWF-Projekt (P 26871 - N20), Kurt Varmuza (PI, TU-Vienna), Notburga Gierlinger (Co-author)
- „S-layer recrystalization though hydrophobic/hydrophilic nanoprotrusions" FWF-projekt (P29562-N28), Jose L. Toca-Herrera (PI), Dietmar Pum (co-author)
- "Shed new light on heartwood formation" DOC-Programme [24763] from the Austrian Academy of Sciences

National / International collaborations

- Dr. Natalia Baranova, Dr. Martin Loose, IST, Austria
- Prof. Peter Lieberzeit, Univ. of Vienna, Inst. of Anal. Chem., Vienna, Austria
- Prof. Carole C. Perry, Nottingham Trent University, Nottingham, UK
- Dr. Rafael Benítez, Univ. of Extremadura, Dept. of Mathematics. Spain
- Dr. Luis Millán González, Univ. of Valencia, Dept. of Physical Education and Sport, Spain
- Dr. Chartchai Krittanai, Mahidol University, Institute of Molecular Biosciences, Thailand
- Prof. M. Schneider, Institute biopharmacy and pharmaceutical technology, University of Saarland
- Prof. Georg Papastavrou, Faculty of Biology, Chemistry, and Earth Sciences, University of Baureuth
- Dr. Maria Vivanco, CICbioGUNE, Spain
- Prof. Longjian Xue, Wuhan University, China
- Dr. Felipe Ortega, Universidad Complutense, Madrid, Spain
- Prof. Ronald F. Ziolo, CIQA – Conacyt, Mexico
- Dr. Spela Zemlijc. University of Ljubjana, Slovenia
- Prof. Hajo Haase / Dr. Claudia Keil, TU-Berlin, Germany
- Dr. Malou Henriksen. CICbiomaGUNE, Spain
- Dr. Anders Lundgren, Chalmers University, Sweden
- Prof. Ingo Burgert, ETH Zurich, Switzerland
- Dr. Michaela Eder, Max Planck Institute of Colloids and Interfaces, Potsdam
- Prof. Anna de Juan, Chemometrics group, University of Barcelona, Diagonal 645, 08028 Barcelona, Spain
- Yaseen Mottiar, Prof. Shawn D Mansfield, University of British Columbia, Forest Sciences Centre 4030, 2424 Main Mall, Vancouver, BC V6T 1Z4, Canada
- Prof. Gilbert Neuner, University of Innsbruck, Institute of Botany, Unit Functional Plant Biology, Sternwartestr. 15, 6020 Innsbruck, Austria
- A.o. Univ. Prof. Ursula Lütz-Meindl, University of Salzburg, Cell Biology and Physiology Department, 5020 Salzburg, Austria
- Prof. Wolfgang Gindl, Institute for Wood technology and Renewable materials, University of Natural Resources and Life Sciences, Vienna, Austria

Student supervision

PhD

1. Alberto Moreno Cencerrado: Proteins at (soft) interfaces
2. Elham Ghorbani Gorji: Resveratrol milk proteins interactions
3. Maria Sumarokova: Mechanical and adhesion properties of protein thin films
4. Zuzana Vanekova (Comenius Univ. Bratislava): Characterization of protein interactions with calorimetry and fluorescence (exchange grant from ÖEAD)
5. Sonia Krysiak (AGH-Krakow): Surface and mechanical properties of fluorescence lipid layers (WTZ exchange project from ÖEAD)
6. Eva Sanchez (Univ. Basque Country): Miscibility, Interactions and Antimicrobial Activity of Poly(ε-caprolactone)/Chloramphenicol Blends (grant of the Regional Basque Government)
7. Batirtze Prats Mateu (START): Raman-imaging and Atomic force microscopy approaches to reveal microchemistry and nanostructure of biological materials
8. Peter Bock (START/ERC): Raman and IR spectroscopy on plant aromatics to gain a better understanding of secondary cell walls
9. Nannan Xiao (ERC): From soft to hard material: Understanding nut shell development at the micro- and nanoscale
10. Nadia Sassani (START): Lignin and cutin distribution and composition on the microscale to understand waterproofing and protection of plants
11. Carmen Texeira (Lincoln University): Phenological development of subterranean clover cultivars (Kathleen Spragg Agricultural Research Trust)

MSc/Diploma/Training/Erasmus

1. Andreas Weber: Mechanical properties of elastomeric polydimethylsiloxane
2. Piet Mitjen (Erasmus Program, Gent University) : Polymer viscoelasticity
3. Christoph Pötcher (collaboration with LIST-company): Microspectroscopy on Mahagony veneers: a way to understand discolorations?
4. Leif Löher (Erasmus Program, TU-Berlin, Germany): cell mechanics
5. Damir Begic (CEEPUS program, University of Sarajevo, Bosnia-Herzegovina): Polymer capsules in drug delivery