List of Publications

Original Articles:

[1] T. Jenkins, L.V. Coutts, D.G. Dunlop, R. O. C. Oreffo, C. Cooper, N.C. Harvey, P. J. Thurner and the OStEO group, *Variability in Reference Point Microindentation and Recommendations for In Vitro Testing – Maximum Load, Sample Orientation, Mode of Use, Sample Preparation and Measurement Spacing*, Journal of the Mechanical Behavior of Biomedical Materials, in press.

[2] C. Karavasili, O. L. Katsamenis, N. Bouropoulos, H. Nazar, P. J. Thurner, S. M. van der Merwe, D. G. Fatouros, *Preparation and characterization of bioadhesive microparticles comprising of low degree of quaternisation trimethylated chitosan for nasal administration: the effect of concentration and molecular weight*, Langmuir, in press.

[3] N. Doroshenko, B. S. Tseng, R. P. Howlin, J. Deacon, J. A. Wharton, P. J. Thurner, B. F. Gilmore, M. R. Parsek and P. Stoodley, *Extracellular DNA impedes the transport of vancomycin in Staphylococcus epidermidis biofilms pre-exposed to sub-inhibitory concentrations of vancomycin*, Antimicrobial Agents and Chemotherapy, in press.

[4] O. Andriotis, W. Manuyakorn, J. Zekonyte, O. L. Katsamenis, S. Fabri, P. H. Howarth, D. E. Davies, P. J. Thurner, *Nanomechanical assessment of human and murine collagen fibrils via atomic force microscopy cantilever-based nanoindentation,* Journal of the Mechanical Behavior of Biomedical Materials, in press

[5] P. J. Thurner, O. Katsamenis, *Role of nanoscale toughening mechanisms in osteoporosis*, D. Burr, (Ed.) ,Section: Bone Quality in Osteoporosis, M. Grynpas and J. Nyman (Co-Section Eds.) Current Osteoporosis Reports (Volume 12, Issue 2), in press, **invited review**

[6] A. W.Lange, H. M. Haitchi, T. D. LeCras, A. Sridharan, Y. Xu, S. E. Wert, J. James, N. Udell, P. J. Thurner, J. A. Whitsett, *Sox17 is required for normal pulmonary vascular morphogenesis*, Developmental Biology 387 (2014) pp. 109–120.

[7] S. Nobakhti, G. Limbert, P. J. Thurner, *Cement lines and interlamellar areas in compact bone as strain amplifiers – Contributors to elasticity, fracture toughness and mechanotransduction*, Journal of the Mechanical Behavior of Biomedical Materials, 29 (2014) pp. 235 – 251.

[8] N. D. Evans, R. O. C. Oreffo, E. Healy, P. J. Thurner, Y. H. Man, *Epithelial mechanobiology, skin wound healing, and the stem cell niche*, Journal of the Mechanical Behavior of Biomedical Materials, 28 (2013) pp.379-409.

[9] R. Hambli, P. J. Thurner, *Finite element prediction with experimental validation of damage distribution in single trabeculae during three-point bending tests*, Journal of the Mechanical Behavior of Biomedical Materials, 27 (2013) pp.94-106.

[10] A. Rmaile, D. Carugo, L. Capretto, J. A. Wharton, P. J. Thurner, M. Aspiras, M. Ward, P. Stoodley, *Microbial Tribology and Disruption of Dental Plaque Bacterial Biofilms*, Wear 306 (2013) pp. 276–284.

[11] O. Katsamenis, T. Jenkins, S. Michopoulou, I. Sinclair, P. J. Thurner, *A Novel Videography Method for Generating Crack Extension Resistance Curves in Small Bone Samples*, PLoS ONE, 8, No. 2 (2013) pp. e55641.

[12] O. Katsamenis, O. Andriotis, H. M. H. Chong, P. J. Thurner , *Load-Bearing in Cortical Bone Microstructure: Selective Stiffening and Heterogeneous Strain Distribution at the Lamellar Level.* Journal of the Mechanical Behavior of Biomedical Materials, 17 (2013) pp.152-156.

[13] M. E. Szabo, P. J. Thurner, *Anisotropy of Bovine Cortical Bone Tissue Damage Properties,* Journal of Biomechanics, 46 (2013) pp.2-6.

[14] M. E. Szabo, M. Taylor, P. J. Thurner, *Similar Damage Initiation but Different Failure Behavior in Trabecular and Cortical Bone Tissue*, Journal of the Mechanical Behavior of Biomedical Materials, 4, No. 8 (2011) pp. 1787-1796, DOI:10.1016/j.jmbbm.2011.05.036

[15] M. Brennan, J. P. Gleeson, M. Browne, F. J. O'Brien, P. J. Thurner, L. McNamara*, Site Specific Increase in Heterogeneity of Trabecular Bone Tissue Mineral during Estrogen Deficiency*, European Cells and Materials, 21 (2011) pp. 396-406.

[16] M. E. Szabo, M. Taylor, P. J. Thurner, *Mechanical Properties of Single Bovine Trabeculae are Unaffected by Strain Rate,* Journal of Biomechanics, 44, No. 5 (2011), pp. 962-967, DOI: 10.1016/j.jbiomech.2010.12.008.

[17] R. Jungmann, M. E. Szabo, G. Schitter, P. K. Hansma, P. J. Thurner. *Local Strain and Damage Mapping in Single Trabeculae during Three-Point Bending Tests,* Journal of the Mechanical Behavior of Biomedical Materials, 4, No. 4 (2011) pp. 523-534, DOI: 10.1016/j.jmbbm.2010.12.009.

[18] P. J. Thurner, C. Chen, S. Ionova-Martin, L. Sun, A. Harman, A. Porter, J. W. Ager III, R. O. Ritchie, T. Alliston, *Osteopontin deficiency increases bone fragility but preserves bone mass,* Bone, 46 (2010), pp. 1564-1573.

[19] J. C. Weaver, G. W. Milliron, P. Allen, A. Miserez, A. Rawal, J. Garay, P. J. Thurner, J. Seto, B. Mayzel, L. J. Friesen, B. C. Chmelka, P. Fratzl, J. Aizenberg, Y. Dauphin, D. Kisailus, D. E. Morse *Unifying Design Strategies in Demosponge and Hexactinellid Skeletal Systems,* Journal of Adhesion, 86, No.1 (2010), pp.72-95.

[20] S. T. Holgate, H. S. Arshad, G. C. Roberts, P. H. Howarth, P. J. Thurner, D. E. Davies, *A new look at the pathogenesis of asthma*, Clinical Science, 118, No.7 (2010), pp.439-450.

[21] P. J. Thurner, *Atomic Force Microscopy (AFM) and Indentation Force Measurement of Bone*. Wiley Interdisciplinary Reviews: Nanomedicine, 1, No.6 (2009), pp. 624-649, **invited review**.

[22] P. J. Thurner, S. Lam, J. C. Weaver, E., D. E. Morse, P. K. Hansma. *Localization of Phosphorylated Serine, Osteopontin, and Bone Sialoprotein on Bone Fracture Surfaces,* Journal of Adhesion, 85 No.8 (2009) pp. 526-545.

[23] P. J. Thurner, B .Erickson, P. Turner, R. Jungmann, J. Lelujian, A. Proctor, J. C. Weaver, G. Schitter, D. E. Morse, P. K. Hansma. *The Effect of NaF In Vitro on the Mechanical and Material Properties of Trabecular and and Cortical bone.* Advanced Materials: Special focus Issue on Biological and Biomimetic Materials Research, 21 (2009) pp. 451-457

[24] B. Zappone, P. J. Thurner, J. Adams, G. E. Fantner, P. K. Hansma. *Effect of Ca^{2+} ions on the adhesion and mechanical properties of adsorbed layers of human Osteopontin.* Biophysical Journal, 95 (2008) pp. 2939-2950.

[25] R. Voide, G. H. Van Lenthe, M. Stauber, P. Schneider, P. J. Thurner, P. Wyss, M. Stampanoni, R. Mueller. *Functional microimaging: a hierarchical investigation of bone failure behavior,* Journal of the Japanese Society of Bone Morphometry 18 (2008) pp.9-21. **Invited paper**

[26] G. Schitter, P. J. Thurner, and P. K. Hansma. *Design and Input Shaping Control of a Novel Scanner for High-Speed Atomic Force.* Mechatronics 18 (2008) pp. 282–288.

[27] A. Miserez, J. C. Weaver, P. J. Thurner, J. Aizenberg, Y. Dauphin, P. Fratzl, D. E. Morse, F. Zok. *Effects of Laminate Architecture on Fracture Resistance of Sponge Biosilica: Lessons from Nature*. Advanced Functional Materials 18 (2008) pp. 1-8 and **cover page**.

[28] G. E. Fantner, J. Adams, P. Turner, P. J. Thurner, L. Fisher, P. K. Hansma. *Human Osteopontin forms ion-mediated networks that can repeatedly dissipate large amounts of energy.* Nano Letters 7 No.8 (2007) pp. 2491-2498.

[29] J. H. Kindt, P. J. Thurner, M. E. Lauer, B. Bosma, G. Schitter, G. E. Fantner, M. Izumi, J. C. Weaver, D. E. Morse, P. K. Hansma. *Direct observation of fluoride-ion induced hydroxyapatite-collagen detachment on bone fracture surfaces by Atomic Force Microscopy.* Nanotechnology 18 (2007) 135102 (8pp) and **cover page**.

[30] G. Schitter, K. J. Aström, B. DeMartini, P. J. Thurner, K. L. Turner, and P. K. Hansma. *Design and Modeling of a High-Speed AFM-Scanner.* IEEE Transactions on Control Systems Technology Special Issue: Dynamics and Control of Micro- and Nano-scale Systems, 15 No.5 (2007) pp.906-915.

[31] P. J. Thurner, B. Erickson, R. Jungmann, Z. Schriock, J. C. Weaver, G. E. Fantner, G. Schitter, D. E. Morse, P. K. Hansma. *High-Speed Photography of Compressed Human Trabecular Bone Correlates Whitening to Microscopic Damage*. Engineering Fracture Mechanics, Vol. 74 (2007) pp. 1928-1941.

[32] P. J. Thurner, B. Erickson, Z. Schriock, J. C. Weaver, J. Langan, J. Scott, M. Zhao, G. E. Fantner, P. Turner, J. H. Kindt, G. Schitter, D. E. Morse, P. K. Hansma. *High-Speed Photography of the Development of Microdamage in Trabecular Bone during*

Compression. Journal of Materials Research, Vol. 21. No. 5 (2006) pp. 1093-1100. **Invited paper**

[33] G. E. Fantner, G. Schitter, J. H. Kindt, T. Ivanov, K. Ivanova, R. Patel, N. Holten-Andersen, J. Adama, P. J. Thurner, I. W. Rangelow, P. K. Hansma. *Components for High Speed Atomic Force Microscopy*. Ultramicroscopy, Vol.106 Issues 8-9 (2006) pp. 881-887.

[34] P. J. Thurner, P. Wyss, R. Voide, M. Stauber, M. Stampanoni, U. Sennhauser, R. Müller. *Time-lapsed investigation of three-dimensional failure and damage accumulation in trabecular bone using synchrotron light*. Bone, 39 (2006) 289-299.

[35] G. E. Fantner, E. Oroudjev, G. Schitter, L. S. Golde, P. Thurner, M. M. Finch, P. Turner, T. Gutsmann, D. E. Morse, H. Hansma, P. K. Hansma. *Sacrificial Bonds and Hidden Length: Unraveling Molecular Mesostructures in Tough Materials*. Biophysical Journal, 90 (2006) pp. 1411-1418.

[36] B. Müller, J. Fischer, U. Dietz, P. Thurner, F. Beckmann. *Capillary staining in the myocardium.* Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms, 246/1 (2006) 254-261.

[37] B. Müller, M. Riedel, P. Thurner. *Three-dimensional characterization of HEK293 cell clusters using synchrotron-radiation-based micro-computed tomography*. Microscopy and Microanalysis, 12 (2006) 97-105 and **cover page**.

[38] G. E. Fantner, O. Rabinovych, G. Schitter, P. Thurner, J. H. Kindt, M. Finch, J. C. Weaver, L. S. Golde, D. E. Morse, E. A. Lipman, I. W. Rangelow, P. K. Hansma. *Hierarchical Interconnections in the Nano-Composite Material Bone: Fibrilar Cross-Links resist Fracture on Several Length Scales.* Composites Science and Technology, 66 (2006) 1202-1208.

[39] P. K. Hansma, G.E. Fantner, J.H. Kindt, P.J. Thurner, G. Schitter, P.J. Turner, S.F. Udwin, M.M. Finch. *Sacrificial bonds in the interfibrillar matrix of bone*. Journal of Musculoskeletal and Neuronal Interactions 5 (4), (2005) 313-315.

[40] P. Wyss, P. Thurner, R. Brönniman, M. Stampanoni, U. Sennhauser, R. Abela, R. Müller. *A sample handler for X-ray tomographic microscopy (XTM) and image-guided failure assessment (IGFA).* Review of Scientific Instruments 76 (2005) 076106-1-076106-3.

[41] P. Thurner, R. Müller, G. Raeber, U. Sennhauser, J. A. Hubbell. *3D Morphology of Cell Cultures – A Quantitative Approach using Micrometer Synchrotron Light Tomography*. Microscopy Research and Technique 66 (2005) 289-298 and **cover page**.

[42] P. Thurner, F. Beckmann, B. Müller. *An optimization procedure for spatial and density resolution in hard X-ray micro-computed tomography*. Nuclear Instruments and Methods B: Beam Interactions with Materials and Atoms 225 (2004) 599-603.

[43] R. Bernhardt, D. Scharnweber, B. Müller, P. Thurner, H. Schliephake, P. Wyss, F. Beckmann, J. Goebbels, H. Worch. *Comparison of microfocus- and synchrotron x-ray*

tomography for the analysis of osteointegration around Ti6Al4V-implants. European Cells and Materials 7 (2004) 42-51.

[44] P. Thurner, B. Müller, U. Sennhauser, J. A. Hubbell, and R. Müller. *Tomography Studies of Biological Cells on Polymer Scaffolds*. Journal of Physics: Condensed Matter, Nr. 33 Vol. 16 (2004) S3499-3510.

[45] P. Thurner, B. Müller, F. Beckmann, T. Weitkamp, C. Rau, R. Müller, J.A. Hubbell, U. Sennhauser. *Tomography studies of human foreskin fibroblasts on polymer yarns.* Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms 200 (2003) 397-405.

[46] R. Klingner, J. Sell, T. Zimmermann, A. Herzog, U. Vogt, T. Graule, P. Thurner, F. Beckmann, B. Müller. *Wood-derived porous ceramics via infiltration of SiO_2-sol and carbothermal reduction.* Holzforschung 57 (2003) 440-446.

[47] B. Müller, F. Beckmann, M. Huser, F.A. Maspero, G. Szekely, K. Ruffieux, P. Thurner, E. Wintermantel. *Non-destructive three-dimensional evaluation of a polymer sponge by micro-tomography using synchrotron radiation.* Biomolecular Engineering 19 (2002) 73-78.

[48] R. Resel, P. Thurner, H. Kahlert, H. Völlenkle, B. Winkler, R. Müllner, F. Stelzer, D. Tunega and G. Leising. *4-(4-Biphenyl)-2,3,5,6-tetrafluoropyridine, a new material for application in light-emitting diodes*. Acta Crystallographica (1999). C55, 693-695.

Book Chapters:

[1] P. J. Thurner and O. L. Katsamenis, *Measuring forces between structural elements in composites: from macromolecules to bone*, In L. Gower and E. Di Masi editors, Biomineralization Handbook: Characterization of Biominerals and Biomimetic Materials, Taylor and Francis, London, in press

[2] P. J. Thurner, E. Oroudjev, R. Jungmann, C. Kreutz, J. H. Kindt, G. Schitter, T. O. Okouneva, M. E. Lauer, G. E. Fantner, H. G. Hansma, P. K. Hansma. *Imaging of Bone Ultrastructure using Atomic Force Microscopy.* In A. Méndez-Vilas, J. Díaz editors, Modern Research and Educational Topics in Microscopy No. 3, Formatex Microscopy Book Series 2007 edition.

[3] R. Müller, A. Nazarian, P. Schneider, M. Stauber, P. Thurner, G. H. van Lenthe, R. Voide. *Functional microimaging at the interface of bone mechanics and biology*. In G. Holzapfel, R. W. Odgen, editors, Mechanics of Biological Tissues, Springer, Heidelberg, ISBN: 3-540-25194-4, (2006) 473-487.

Thesis:

[1] P. Thurner, *Imaging of Cellular and Extra-Cellular Stressed Matter Using Synchrotron Radiation Based Micro-Computed Tomography*, PhD Thesis, Swiss Federal Institute of Technology (ETH) Zurich, Zurich, Switzerland, 2004.

[2] P. Thurner. *X-ray Structural Analysis and Photothermal Deflection Spectroscopy on Conjugated Organic Materials*, Diploma (MSc) thesis, University of Technology Graz, Graz, Austria 1999.

Proceeding Papers:

[1] O. Katsamenis, T. Jenkins, S. Michopoulou, I. Sinclair, P. J. Thurner, *Multiscale Experimental Analysis of Human Bone Fracture Toughness: From the Osteonal up to the Tissue Level*, Trans. Orthop Res. 38:0375, 2013

[2] T. Jenkins, O. Katsamenis, N. C. Harvey, S. Michopoulou, I. Sinclair, P. J. Thurner, *Whitening Front Tracking: A High-Speed Videography Method for Assessing Fracture Toughness of Small Bone Samples*, Trans. Orthop Res. 38:1501, 2013

[3] O. Andriotis, S. hang, M. Vanleene, D. E. Davies, S. J. Shefelbine, M. J. Buehler, P. J. Thurner, *COL1A1 gene mutation alters the molecular structure of tropocollagen and the nanoelasticity of collagen fibrils: a joint experimental and computational study*, Trans. Orthop Res. 38:1427, 2013

[4] M. Brennan, M. Browne, F. J. O'Brien, P. J. Thurner, L. McNamara, *Oestrogen's Role in Regulating Mineralisation of Bone Cells*, Proceedings of the 17th Annual Conference, Section of Bioengineering, of the Royal Academy of Medicine in Ireland, Galway, Ireland, January 28-29, 2011,

[5] M. Brennan, M. Browne, F. J. O'Brien, P. J. Thurner, L. McNamara, *Site Specific Increase in Heterogeneity of Bone Tissue Mineral during Estrogen Deficiency*, Trans. Orthop Res. 36:2267, 2011

[6] O. Katsamenis, M. Taylor, P. J. Thurner, *Nano- and Microcracking in Cortical Bone Captured with Time-lapsed Atomic Force Microscopy*, Trans. Orthop Res. 36:0324, 2011

[7] M. E. Szabo, M. Taylor, P.J. Thurner, *Similar Damage Initiation but Different Failure Behavior in Trabecular and Cortical Bone Tissue*, Trans. Orthop Res. 36:2204, 2011

[8] P. J. Thurner, C. Chen, S. S. Ionova-Martin, L. Sun, J. W. Ager, R. O. Ritchie, T. Alliston, *Reduced Fracture Toughness in Osteopontin Knockout Mice is due to Changes in Bone Matrix Material Properties*, Trans. Orthop Res. 35:0651, 2010

[9] M. A. Brennan, M. Browne, F. J. O'Brien, P. J. Thurner, L. M. McNamara, *Quantifying Changes in Bone Mineral during Osteoporosis using qBEI*, Proceedings of the 15th Annual Conference, Section of Bioengineering, of the Royal Academy of Medicine in Ireland, Limerick, Ireland, January 2009

[10] M. A. Brennan, M. Browne, F. J. O'Brien, P. J. Thurner, L. M. McNamara, *Delineating Bone Tissue Mechanics during Osteoporosis using QBEI*, Proceedings of the 3rd International Conference on Mechanics if Biomaterials & Tissues, Clearwater, Florida, USA, December 13-17 2009

[11] P. J. Thurner, B. Zappone, S. Lam, J. Adams, J. C. Weaver, G. E. Fantner, D. E. Morse, P. K. Hansma, *The Molecular Self-Healing Mechanism of Bone – Localization and Mechanical Properties of Noncollagenous Proteins*, Trans. Orthop Res. 34:0669, 2009

[12] P. J. Thurner, R. Tang, R. Jungmann, D. Vashishth, P. K. Hansma, *Determination of Local Strains Involved in Microdamage Formation and Failure in Single Trabeculae Loaded in Three-Point Bending*, Trans. Orthop Res. 33:0449, 2008 **– new investigator recognition award finalist.**

[13] P. J. Thurner, C. Chen, J. W. Ager, R. O. Ritchie, T. Alliston, *Specification of Bone Matrix Material Properties through Regulation of TGF-β Function and Osteopontin Expression*, Trans. Orthop Res. 33:0878, 2008

[14] R. Jungmann, G. Schitter, G. E. Fantner, M. E. Lauer, P. K. Hansma, P. J. Thurner, *Real-Time Microdamage and Strain Detection during Micromechanical Testing of Single Trabeculae*, In: Experimental and Applied Mechanics: SEM Annual Conference and Exposition 2007 (3 Vols), June 3-6 2007, Springfield, Massachusetts, USA

[15] G. Schitter, G. E. Fantner, P. J. Thurner, Jonathan Adams and P. K. Hansma. *Design and Characterization of a Novel Scanner for High-Speed Atomic Force Microscopy.* 4th IFAC-Symposium on Mechatronic Systems, Heidelberg, Germany, September 12th-14th, 2006 **– best young author award.**

[16] G. Schitter, K. J. Åström, B. DeMartini, G. E. Fantner, K. Turner, P.J. Thurner, and P. K. Hansma. *Design and Modeling of a High-Speed Scanner for Atomic Force Microscopy.* Submitted to IEEE/ACC, Minneapolis, Minnesota, USA, June 14-16, 2006.

[17] R. Voide, G. H. van Lenthe, P. Schneider, P. J. Thurner, P. Wyss, U. Sennhauser, M. Stampanoni, M. Stauber, J. Snedeker and R. Müller. Functional microimaging: an integrated approach for advanced bone biomechanics and failure analysis. In A. Manduca, editor, Physiology, Function, and Structure from Medical Images, SPIE Vol. 6143, 61430X:1-12, 2006.

[18] G. Schitter, G. E. Fantner, J. H. Kindt, P. J. Thurner, P. K. Hansma. *On Recent Developments for High-Speed Atomic Force Microscopy.* Proceedings of the 2005 IEEE/ASME International Conference on Advanced Intelligent Mechatronics, Monterey, California, USA, 24-28 July, 2005, 261-264.

[19] J. H. Kindt, G. E. Fantner, P. J. Thurner, G. Schitter, P. K. Hansma. *A new Technique for Imaging Mineralized Fibrils on Bovine Trabecular Bone Fracture Surfaces by Atomic Force Microscopy*. Mater. Res. Soc. Symp. Proc. 874, 2005, L5.12.1-L5.12.7.

[20] P. J. Thurner, B. Erickson, Z. Schriock, J. Langan, J. Scott, M. Zhao, G. E. Fantner, P. Turner, J. H. Kindt, G. Schitter, P. K. Hansma. *High-Speed Photography of Human Trabecular Bone during Compression*. Mater. Res. Soc. Symp. Proc. 874, 2005, L1.2.1-L1.2.6. – **outstanding meeting paper**

[21] P. J. Thurner, R. Müller, J. H. Kindt, G. Schitter, G. E. Fantner, P. Wyss, U. Sennhauser, P. K. Hansma. *Novel Techniques for High-Resolution Functional Imaging of Trabecular Bone*. In A. A. Amini, A. Manduca, editors, Medical Imaging 2005: Physiology, Function, and Structure from Medical Images, SPIE Vol. 5746, pp. 515-526, 2005.

[22] P. J. Thurner P. Wyss, R. Voide, M. Stauber, B. Müller, M. Stampanoni, J. A. Hubbell, R. Müller, and U. Sennhauser. *Functional Micro-Imaging of Soft and Hard Tissue using Synchrotron Light.* In U. Bonse, editor, Developments in X-Ray Tomography IV, SPIE Vol. 5535, pp. 112-128, 2004.

[23] R. Müller, M. Stauber, A. Nazarian, P. Thurner, R. Voide and G. H. van Lenthe. *Functional microimaging at the interface of bone mechanics and biology*. Proc. 10th Mediterranean Conference of the International Federation for Medical and Biological Engineering (IFMBE), July 31 - August 5, Ischia, Italy, 64.1-64.4, 2004.

[24] P. Wyss, P. Thurner, M. Stampanoni, A. Obrist, J. Hofmann, T. Lüthi, U. Sennhauser, R. Müller, R. Abela, B. Patterson. *X-ray Tomographic and Laminographic Microscopy (XTM, XLM) using Synchrotron Radiation.* International Symposium on Computed Tomography and Image Processing for Industrial Radiology, June 23-25, Berlin, Germany, Vol. BB 84-CD, ISBN 3-931381-48-X, 2003.

[25] P. Thurner, P. Wyss, A. Obrist, U. Sennhauser and R. Müller. *Image guided fatigue assessment of bovine trabecular bone using synchrotron radiation (SR)*. Abstracts 13th Annual Meeting Europ. Orthop. Res. Soc., Helsinki, Finland, June 4-7, Trans. Europ. Orthop. Res. Soc., 13:14, 2003.

[26] P. Thurner, M. Stampanoni, J. A. Hubbell and R. Müller. *Investigation of microcracks in trabecular bone using synchrotron radiation based micro-computed tomography (SRμCT).* Trans. Europ. Orthop. Res. Soc., 12:P-37, 2002.

[27] B. Müller, P. Thurner, F. Beckmann, T. Weitkamp, C. Rau, R. Bernhardt, E. Karamuk, L. Eckert, S. Buchloh, E. Wintermantel, D. Scharnweber, H. Worch. *Three-dimensional evaluation of biocompatible materials by microtomography using synchrotron radiation.* In U. Bonse, editor, Developments in X-Ray Tomography III, SPIE Vol. 4503, 2002, 178-188.

[28] P. Thurner, E. Karamuk, B. Müller. *3-D characterization of fibroblast cultures on PET-textiles.* European Cells and Materials 2 (1), 2001, 57-58.

Abstract Papers:

[1] P. J. Thurner, O. L. Katsamenis, S. Nobakhti, T. Jenkins, N. Harvey, G. Limbert, *Micro- and nanomechanics of bone affect mechanical performance and mechanobiology*, 7th World Congress of Biomechanics, Boston, MA, USA, July 6-11 2014.

[2] O. L. Katsamenis, L. D. Silverman, N. Bouropoulos, E. S. Sørensen[4], J. D. Kilburn, P. J. Thurner, *Mechanical Interaction between Osteopontin and Hydroxyapatite*, 7th World Congress of Biomechanics, Boston, MA, USA, July 6-11 2014.

[3] O. G. Andriotis, M. Vanleene, S. J. Shefelbine, D. E. Davies, P. H. Howarth, P. J. Thurner, *The very stiff collagen fibril of the oim mouse model of osteogenesis imperfecta*, 7th World Congress of Biomechanics, Boston, MA, USA, July 6-11 2014.

[4] L. Coutts, T. Jenkins, R. Oreffo, D. Dunlop[3], C. Cooper, N. C Harvey[2] and P. Thurner, *Comparison of Mechanical and Geometrical Properties with Mineral Density in Human Femoral Neck Cortical Bone*, 7th World Congress of Biomechanics, Boston, MA, USA, July 6-11 2014.

[5] P. Stoodley, A. Rmaile, S. Fabbri, D. Carugo, M. Aspiras, M. De Jager, M. Ward, P. J. Thurner, A. W. Decho and N. Noffke, *The Mechanical Properties of Bacterial Biofilms as a Strategy for Survival in Ancient and Modern Environments*, Biofilms 6, Vienna, Austria, May 11-13 2014.

[6] P. J. Thurner, O. L. Katsamenis, T. Jenkins, L. Coutts, O. Andriotis, T. Li, D. Dunlop, R. O. C. Oreffo, C. Cooper and N. Harvey, *Modulation of elasticity in human bone for improved fracture toughness*, 5th International Conference on Mechanics of Biomaterials and Tissues, Sitges, Spain, December 8-12th 2013.

[7] N. Doroshenko, B.S. Tseng, M. R. Parsek, J. Wharton, P. Thurner and P. Stoodley, *Biofilms at sub-inhibitory concentrations of vancomycin*, Eurobiofilms – Third European Congress on Microbial Biofilms, Ghent, Belgium, September 9-12 2013

[8] O. Andriotis, D. Smart, S. P. Robins, Wiparat Manuyakorn, O. L. Katsamenis, P. H. Howarth, D. E. Davies, P. J. Thurner, *Cross-link Density and Type are strong Determinants of Collagen Fibril Nanoelasticity*, Abstracts 19th Congress of the European Society of Biomechanics (ESB), Patras, Greece, August 25-28, 2013 (**Student Award**)

[9] O. L. Katsamenis, T. Jenkins, F. Quinci, S. Michopulou, I. Sinclair, P. J. Thurner *Measuring Fracture Toughness of Small Bone Samples by means of the Whitening-Front Tracking* Method, Abstracts 19th Congress of the European Society of Biomechanics (ESB), Patras, Greece, August 25-28, 2013.

[10] T. Li, T. Jenkins, R. O. C. Oreffo, P. J. Thurner, *Molecular Origins of Bone Micromechanics*, Abstracts 19th Congress of the European Society of Biomechanics (ESB), Patras, Greece, August 25-28, 2013.

[11] N. Udell, I. Sinlair, M. S. Nixon, H. M. Haitchi, P. J. Thurner, *The Determination of Murine Airway Morphology from Microfocus Computer Assisted Tomography using Tracing*, Abstracts 19th Congress of the European Society of Biomechanics (ESB), Patras, Greece, August 25-28, 2013.

[12] S. Nobakhti, O. L. Katsamenis, O. G. Andriotis, G. Limbert, P. J. Thurner, *Micromechanical Model of Bovine Haversian Bone Predicts Strain Amplification through Soft Interfaces*, Abstracts 19th Congress of the European Society of Biomechanics (ESB), Patras, Greece, August 25-28, 2013.

[13] T. Jenkins, L. V. Coutts, N. C. Harvey, R. O. C. Oreffo, D. G. Dunlop, C. Cooper, P. J. Thurner, *Reference Point Indentation Trends of the Human Femoral Neck*, Abstracts 19th Congress of the European Society of Biomechanics (ESB), Patras, Greece, August 25-28, 2013.

[14] L. V. Coutts, T. Jenkins, N. C. Harvey, R. O. C. Oreffo, D. G. Dunlop, C. Cooper, P. J. Thurner, *Regional Variation in Reference Point Indentation in Healthy & Diseased Cortical Bone*, Abstracts 19th Congress of the European Society of Biomechanics (ESB), Patras, Greece, August 25-28, 2013.

[15] S. Nobakhti, O. L. Katsamenis, O. G. Andriotis, G. Limbert, P. J. Thurner, *Micromechanics of Haversian Bovine Bone*, 11th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, Salt Lake City, Utah, USA, April 3-7 2013.

[16] N. P. Udell, I. Sinlair, M. S. Nixon, H. M. Haitchi, P. J. Thurner, *Tracing as a Tool for Determining Murine Airway Morphology from Microfocus Computer Assisted Tomography Data*, 11th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, Salt Lake City, Utah, USA, April 3-7 2013.

[17] M. Taylor, E. Perilli, P. J. Thurner, *Comparison of Performance of Implicit and Explicit Solvers for the Analysis of Micro-CT based Finite Element Models*, 11th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, Salt Lake City, Utah, USA, April 3-7 2013.

[18] N. Doroshenko, B.S. Tseng, M. R. Parsek, J. Wharton, P. Thurner and P. Stoodley. *Potential role of biofilm extracellular DNA (eDNA) in vancomycin binding*, Biofilms 5, Paris, France, December 10-12 2012 (**Best poster award**).

[19] O. L. Katsamenis, T. Jenkins, S. Michopulou, I. Sinclair, P. J. Thurner, *A Novel Method for Generating Crack Extension Resistance Curves in Small Bone Samples using High-Speed Videography*, 20th Annual Meeting of the European Orthopaedic Research Society (EORS), Amsterdam, The Netherlands, September 26-28, 2012.

[20] P. J. Thurner, O. L. Katsamenis, S. Nobakhti, O. Andriotis, H. M. H. Chong, and G. Limbert, *Microstructure, Interfaces, Composition - Towards Better Microscale Experimentation and Models of Bone*, European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS) 2012, Vienna, Austria, September 10-14, 2012.

[21] O. Andriotis, D. Smart, D. E. Davies, P. H. Howarth, P. J. Thurner, *Non-Enzymatic Glycation increases indentation modulus of type I native collagen fibrils*, Seeing at the Nanoscale 2012, Bristol, UK, July 9-11, 2012.

[22] O. L. Katsamenis, O. G. Andriotis, P. J. Thurner, *Distribution of Nanoelasticity on the Osteonal Level Effects Bone Fracture Toughness Behaviour*, Abstracts 18th Congress of the European Society of Biomechanics (ESB), Lisbon, Portugal, July 1-4, 2012.

[23] O. Andriotis, M. Vanleene, S. Shefelbine, P. J. Thurner, *Collagen Nanostiffness is Severely Impaired in OI Mice*, Abstracts 18th Congress of the European Society of Biomechanics (ESB), Lisbon, Portugal, July 1-4, 2012.

[24] O. L. Katsamenis, M. Taylor, P. J. Thurner, *Probing Laminar Bone's Behaviour by Means of AFM with in-situ Sample Stretching*, Abstract of the 2011 Scanning Probe Microscopy Meeting of the Royal Microscopical Society (RMS), Edinburgh, UK, June 22-23 2011.

[25] O. Andriotis, W. Manuyakorn, O. Katsamenis, P. H. Howarth, D. E. Davies, and P. J. Thurner, *Structural and Mechanical Investigation of Human and Murine Collagen*, Abstracts of the 2011 Scanning Probe Microscopy Meeting of the Royal Microscopical Society (RMS), Edinburgh, UK, June 22-23 2011.

[26] N. Doroshenko, R. Johnson, J. Speed, J. Wharton, P. Thurner, A. Russell and P. Stoodley. *A model of biofilm EPS for optimizing micro Raman spectroscopic analysis as related to antibiotic resistance*, Biofilms 4, Winchester, UK, September 1-3 2010.

[27] W. Manuyakorn, O. Katsamenis, T. Li, P. Thurner, D. Davies, P. Howarth. *The structure and cross-linking of collagen in asthma*, Abstracts Congress of European Academy of Allergy and Clinical Immunology (EAACI), Istanbul, Turkey, June 11-15 2011

[28] P. J. Thurner, B. Zappone, S. Lam, J. Adams, J. C. Weaver, G. E. Fantner, P. K. Hansma, *Can the Mechanical Properties of Noncollagenous Proteins Influence Whole Bone Mechanics?,* Abstracts 17th Congress of the European Society of Biomechanics (ESB), Edinburgh, UK, July 5-8, 709, 2010.

[29] O. Katsamenis, T. Boughen, P. J. Thurner, Imaging of Crack Propagation in Bone with Atomic Force Microscopy, Abstracts 17th Congress of the European Society of Biomechanics (ESB), Edinburgh, UK, July 5-8, 1058, 2010.

[30] P. J. Thurner, J Zekonyte, S. Fabri , *Cantilever-based Nanoindentation for the Characterization of Thin Films and Soft Materials*, Abstracts Camtec II, Cambridge, UK, March 29-30 2010

[31] P. J. Thurner, C. Chen, B. Zappone, S. Ionova, S. Lam, J. Adams, J. C. Weaver, L. Sun, G. E. Fantner, J. W. Ager, P. K. Hansma, R. O. Ritchie, T. Alliston, *Noncollagenous Proteins and Bone Mechanics - From Protein Networks to Osteopontin-deficient Mouse Bones*, Abstracts 22nd European Conference of Biomaterials, Lausanne, Switzerland, September 7-11, 348, 2009

[32] M. Szabo, P. J. Thurner, *Experimental Assessment of Local Strains at Microdamage Initiation and Failure in Single Trabeculae*, Abstracts 22nd European Conference of Biomaterials, Lausanne, Switzerland, September 7-11, 1000, 2009

[33] B. Zappone, P. Thurner, J. Adams, G. Fantner, P. Hansma, *Nanoscale measurements of adhesion and mechanical properties of human bone protein Osteopontin*, 2nd National Nanomedicine Conference, Pavia, Italy, 21-22 September 2009.

[34] P. J. Thurner, R. Jungmann, R. Tang, G. Schitter, D. Vashishth, P.K. Hansma. *Prediction of Trabecular Level Microdamage and Bone Fracture through Local Strain*. Abstracts 30th Annual Meeting ASBMR, Montreal, Canada, J. Bone Miner. Res., 23:S362, 2008.

[35] P. J. Thurner, C. Chen, S. Ionova, J. W. Ager, R.O.R. Ritchie, T. Alliston. *Changes in bone matrix material properties due to osteopontin deficiency – **plenary poster***. Abstracts 30th Annual Meeting ASBMR, Montreal, Canada, J. Bone Miner. Res., 23:S98, 2008.

[36] G. E. Fantner, J. Adams, P. Turner, P. J. Thurner, P. K. Hansma. *Molecular mechanisms contribute to the fracture resistance of bone: repeatable energy dissipation by sacrificial bonds and hidden length in molecular networks.* AFM BioMed Conference, Barcelona, Spain, April 19 – 21 2007.

[37] P. J. Thurner, B. Erickson, J. Weaver, R. Jungmann, G. Schitter, G. E. Fantner, D. E. Morse, P. K. Hansma. *Real-Time Microdamage Detection during Micromechanical Testing of Trabecular Bone.* World Biomechanics Conference, Munich, Germany, July 29 – August 4 2006 / Journal of Biomechanics, 2006. **39**(Supplement 1): p. S244-S244.

[38] P. Thurner, B. Erickson, Z. Schriock, P. Turner, G. E. Fantner, P. K. Hansma. *High-Speed Photography of Compressed Human Trabecular Bone detects Microscopic Delamination Fractures in Real Time*, First International Conference on Mechanics of Biomaterials and Tissues, Waikoloa, Hawaii, USA, December 11-15, 2005.

[39] R. Müller, A. Nazarian, P. Schneider, M. Stauber, P. Thurner, G. H. van Lenthe and R. Voide. Dynamic imaging of bone function - a hierarchical approach. Abstracts Second Japan-Switzerland Workshop on Biomechanics - New Trends in Biomechanics: From Biomolecules to Tissue, Kyoto, Japan, September 12-16, 38, 2005.

[40] G. E. Fantner, G. Schitter, J. H. Kindt, Tzv. Ivanov, K. Ivanova, P. Thurner, I. W. Rangelow, P. K. Hansma. *Advanced Cantilever Technologies for High Speed AFM*. Abstracts Seeing at the Nanoscale III, University of California Santa Barbara, August 13-16 2005, p. 73.

[41] G. Schitter, G. E. Fantner, J. H. Kindt, P. J. Thurner, P. K. Hansma. *High-Speed Atomic Force Microscopy: 10 x 10 Micron Images at Six Images/Sec. And Beyond*. Abstracts Seeing at the Nanoscale III, University of California Santa Barbara, August 13-16 2005, p. 65.

[42] P. J. Thurner, G. Schitter, G. E. Fantner, J. H. Kindt, P. K. Hansma. *Exploring the Nano-Structure of Human Bone by AFM during Time-Lapsed Chemical Dissection*. Abstracts Seeing at the Nanoscale III, University of California Santa Barbara, August 13-16 2005, p. 33.

[43] P. K. Hansma, G. E. Fantner, J. H. Kindt, P. Thurner, G. Schitter, P. J. Turner, S. F. Udwin, M. M. Finch. *Sacrificial Bonds in the Interfibrillar Matrix of Bone.* Abstracts of the 35th International Sun Valley Workshop on Skeletal Tissue Biology, July 31-August 3,

2005 Sun Valley, Idaho, USA. Journal of Musculoskeletal and Neuronal Interactions 2005 (4):313-315.

[44] G. E. Fantner, T. Hassenkam, J. H. Kindt, J. C. Weaver, H. Birkedal, L. Pechenik, J. A. Cutroni, L. Golde, M. M. Finch, P. J. Thurner, G. A. G. Cidade, G. D. Stucky, D. E. Morse, P. K. Hansma, *A Fracture Resisting Molecular Interaction in Trabecular Bone: Sacrificial Bonds and Hidden Length Dissipate Energy as Mineralized Fibrils Separate.* Abstracts Materials Research Society Spring Meeting 2005, San Francisco, USA, March 28 – April 1.

[45] J. H. Kindt, G. E. Fantner, P. Thurner, G. Schitter, P. K. Hansma. *In-Situ Atomic Force microscopy of Bone Fracture Surfaces Reveals Collagen Fibrils Individually Coated with Mineral Particles pf Varying Shape and Size.* Abstracts American Physical Society March Meeting 2005, Los Angeles, USA, March 21-25, Bulletin of the American Physical Society Vol. 50, No. 1, Part II, p. 1176, 2005, ISSN 0003-0503.

[46] P. Thurner, J. Langan, J. Scott, M. Zhao, B. Erickson, Z. Schriock, G. Fantner, P. K. Hansma. *High-Speed Photography during Compression Testing of Human Trabecular Bone*. Abstracts American Physical Society March Meeting 2005, Los Angeles, USA, March 21-25, Bulletin of the American Physical Society Vol. 50, No. 1, Part II, p. 1176, 2005, ISSN 0003-0503.

[47] M. Stampanoni, R. Abela, A. Bertrand, S. Hunt, R. Krempaska, B. Patterson, P. Wyss, U. Sennhauser, P. Thurner, P. Schneider, R. Müller, E. P. Meyer, T. Krucker and C. Bron. *Absorption and phase contrast microtomography at the swiss light source*. Abstracts 65. Jahresverammlung der Schweizerischen Gesellschaft für Anatomie, Histologie und Embryologie, Lausanne, Switzerland, October 10, p. 31, 2003.

[48] R. Bernhardt, P. Thurner, D. Scharnweber, B. Müller, F. Beckmann, H. Worch. *Morphological Investigation of Bone-Formation on Surface modifiedTi6Al4V-Implants with Micro Computed Tomography (µCT).* European Society for Biomaterials 16th European Conference, London, U.K., September 12-14, 2001.

[49] P. Thurner, P. Wyss, R. Bernhardt, F. Beckmann, J. Goebbels, B. Müller, J. Mayer, D. Scharnweber, M. Dard, H. Schliephake, E. Wintermantel, and H. Worch. *3-D Microtomography (µCT) Investigations of the Interface Bone/Titanium Implant.* Abstracts, Biomaterialien im Gelenkbereich, Ulm, Germany, November 24-25, 2000.

Media Appearances and Annual Reports:

[1] Inside Diamond – News from the UK synchrotron Winter 2013, *Dem Bones, Dem Bones*, p.15, November 2013

[2] Daily Mail online, *A needle pushed into your shin will predict if you're likely to get brittle bones*, October 7 2013, http://www.dailymail.co.uk/health/article-2449174/A-needle-pushed-shin-predict-youre-likely-brittle-bones.html?ico=health%5Eheadlines

[3] The Engineer, Handheld device finds early signs of osteoporosis, September 22 2013, http://www.theengineer.co.uk/medical-and-healthcare/news/handheld-device-finds-early-signs-of-osteoporosis/1017134.article

[4] News Medical, Handheld device for diagnosing early signs of osteoporosis, September 18 2013, http://www.news-medical.net/news/20130918/Handheld-device-for-diagnosing-early-signs-of-osteoporosis.aspx

[5] Arthritis Research UK, *UK researchers develop new early-warning test for osteoporosis* -, September 18 2013, http://www.arthritisresearchuk.org/news/general-news/2013/september/uk-researchers-develop-new-early-warning-test-for-osteoporosis.aspx

[6] Medgadget, *Handheld Device Tests Bone's Microindentation to Spot Osteoporosis*, September 18 2013, http://www.medgadget.com/2013/09/handheld-device-tests-bones-microindentation-to-spot-osteoporosis.html

[7] Technology,org, *Early-warning device could test for osteoporosis*, September 18 2013, http://www.technology.org/2013/09/18/early-warning-device-test-osteoporosis/

[8] Science Daily, *Portable, Low-Cost Early-Warning Test for Osteoporosis*, September 17 2013, http://www.sciencedaily.com/releases/2013/09/130917090211.htm

[9] Alphagalileo, *Portable, low-cost early-warning test for osteoporosis*, September 17 2013, http://www.alphagalileo.org/ViewItem.aspx?ItemId=134554&CultureCode=en

[10] EPSRC, *Portable, Low-Cost Early-Warning Test for Osteoporosis*, September 17 2013, http://www.epsrc.ac.uk/newsevents/news/2013/Pages/osteoporosisearlywarningtest.aspx

[11] Swiss Federal Institute of Technology Zurich, ETH-Life (daily newsletter), *Das Überflüssige sichtbar machen.* October 11 2006.

[12] Swiss National Science Foundation, Horizonte (Monthly Journal), Picture of the Month, September 2006 p.7. Im Bild: Kern und Schale.

[13] Swiss Federal Laboratories for Materials Research and Testing (EMPA) Annual Report 2004 p.28-29. Zestörungsfreier Einblick in die Struktur der Knochen.

[14] Paul Scherrer Institute (PSI) Scientific Annex 2004. *Synchrotron-Radiation-Based Micro Computed Tomography of blood vessels in the Myocardium*. B. Müller, J. Fischer, P. Thurner, F. Beckmann.

[15] EMPA activities 2004. *3D Cell Culture Morphology uncovered with Synchrotron Light Visualization of Biological Cells using Hard Synchrotron Light.* P. Thurner, U. Sennhauser.

[16] EMPA activities 2004. *Fatigue and Failure of Trabecular Bone.* P. Thurner, P. Wyss, D. Rechenmacher, R. Muff, U. Sennhauser.

[17] PSI Scientific Annex 2003. *Image Guided Failure Assessment of bone using synchrotron light*, P. Thurner, D. Webster, M. Stauber, P. Wyss, U. Sennhauser, R. Mueller.

[18] EMPA activities 2003. *3D Visualization of Biological Cells using Hard Synchrotron Light.* P. Thurner, U. Sennhauser.

[19] PSI Annual Report p.9. *Bone Failure and Brain Disease.*

[20] PSI Scientific Annex 2002. *X-ray Microtomography at SLS: The First Year.* M. Stampanoni, P. Thurner, P. Schneider, R. Abela, B.D. Patterson, S. Hunt, R. Krempaska, M. Grunder.

[21] EMPA activities 2002. Applications of X-ray Tomographic Microscopy (XTM) in materials and life sciences. P. Wyss, P. Thurner, U. Sennhauser.