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CURRICULUM VITAE

Bianca Haberl

Academic Qualifications:

- Jul 2011** Ph.D. (physics) at the Australian National University (ANU), Canberra Australia;
Thesis title: “*Structural Characterization of Amorphous Silicon*”
- Sep 2006** Diplom/M.Sc. (physics) at the University of Augsburg, Germany
- Feb 2002 - Feb 2003** Internship at the Australian National University, Canberra, Australia

Professional Experience:

- Jul 2011 – Apr 2014** Postdoctoral Researcher, Research School of Physics and Engineering, ANU, Canberra, Australia (including promotion to ANU Level B in 2013). This was a research position with some teaching responsibilities at undergraduate and graduate level.
- Aug 2014 – Nov 2016** Weinberg Fellow at Oak Ridge National Laboratory. This Distinguished Fellowship represents an ORNL staff position with responsibility to the laboratory’s mission as well activities for individual research.
- Nov 2016 – present** NScD High Pressure Science Coordinator at ORNL. This is a full-time appointment as an ORNL staff associate with the purpose to drive coordination, development, scientific endeavours and outreach for the high-pressure science and technology program.
- Oct 2017 – Nov 2018** Additional role as interim instrument scientist on SNS’s dedicated high pressure beamline, SNAP due to beamline’s critical need for high-pressure support.
- Nov 2018 – present** Leader of one of the NScD Science Initiatives, the High-Pressure Initiative and High Pressure Scientist in Sample Environment.

Research Interests:

My research interests are centered on the synthesis of functional exotic structures of materials based on the Group IVa elements carbon, silicon and germanium using extreme conditions. The aim of these syntheses are materials that can be recovered to ambient conditions from local energy minima in their high-pressure landscape and that exhibit highly advantageous properties such as a hardness higher than that diamond, characteristics superior for solar power conversion or enabling new methods for energy transport.

These aims are facilitated through detailed *in situ* investigation of phase behaviors during application of extreme conditions using neutron and X-ray scattering, the exploitation of disordered precursor materials for their lower kinetic barriers and in-depth characterization of precursor and recovered materials. This is accompanied by the technological development of large-volume high-pressure capabilities, which are then deployed simultaneously for synthesis and high-pressure neutron scattering.

Conference Awards:

- **Best Senior Poster Award** at Joint AIRAPT/EHPRG 2015.
- **Best Student Presentation** at AMAS XI in 2011.
- **MRS Graduate Student Silver Award** at the MRS Spring Meeting in 2010.
- **Best Oral Paper Award** at the IUMRS-ICEM in 2008.
- **Graduate Student Award** at the Australian Nanoindentation Workshop in 2005.

Professional Societies

- **European High Pressure Research Group** since 2011.
- **AIRAPT** (International Association for the Advancement of High Pressure Science and Technology) since 2013.
- **Neutron Scattering Society of America** since 2016.
- **American Physical Society** since 2018.

Synergistic Activities:

- 8 invited oral conference presentations, 11 invited seminars at research organizations, 33 contributed oral conference presentations and 4 contributed conference posters.
- Session co-Organizer at the APS March Meeting 2019 (Boston, MA) of: *“Focus Session: Matter in Extreme Conditions”*.
- Scientific Advisory Committee/Symposium Organizer at EHPRG 2019 (Prague, Czech Republic) with a focus on Large Scale Facilities/High Pressure Neutron Scattering.
- Lead Symposium Organizer at Euromat 2019 (Stockholm, Sweden) titled: *“Synthesis, optimization and characterization through extreme conditions of energy-relevant materials”*.
- Guest Editor for the *“Special Topic: Advances in Modern Neutron Diffraction”* containing 14 peer-reviewed manuscripts published in Review of Scientific Instruments, September 2018.
- Co-Chair of the National Neutron and X-ray Summer School since 2018.
- Committee member of the organizing ORNL Neutron Day Committee since 2018.
- Chair of the High-Pressure Sample Environment Steering Committee at NScD since 2016.
- Member of the NScD WiNS steering committee since 2016.
- Organizer of the ORNL High Pressure Interest Group Seminar Series since 2015.
- Key organizer of an EFree meeting at ORNL in Dec 2015.
- Organizing committee member of the joint ARNAM/ARCNN 2010 workshop
- Responsible organizer of the poster sessions at the ARNAM Workshop 2009.
- Conference proceedings and session assistant at IUMRS-ICEM 2008.
- Conference assistant for the Australian Nanoindentation Workshop 2007 and 2009.

Full List of Publications

(Can be verified on Web of Science through my ResearcherID: F-9058-2011)

1. J. Frantti, Y. Fujioka, J.J. Molaison, R. Boehler, B. Haberl, C.A. Tulk and A.M. dos Santos, “*Compression mechanisms of ferroelectric PbTiO₃ via high pressure neutron scattering*”, **Journal of Physics: Condensed Matter** **30**, 435702 (2018).
2. A. Podlesnyak, M. Loguillo, G.M. Rucker, B. Haberl, R. Boehler, G. Ehlers, L.L. Daemen, D. Armitage, M.D. Frontzek, M. Lumsden, “*Clamp cell with in situ pressure monitoring for low-temperature neutron scattering measurements*”, **High Pressure Research** **38**, 482 (2018).
3. K. Page, B. Haberl, L. Coates, M. Tucker, “*Preface: Special Topic on Advances in Modern Neutron Diffraction at Oak Ridge National Laboratory*”, **Review of Scientific Instruments** **89**, 092601 (2018).
4. B. Haberl, S. Dissanayake, Y. Wu, D. A.A. Myles, A. M. dos Santos, M. Loguillo, G.M. Rucker, D.P. Armitage, M. Cochran, K.M. Andrews, C. Hoffmann, H. Cao, M. Matsuda, F. Meilleur, F. Ye, J.J. Molaison, R. Boehler, “*Next-generation diamond cell and applications to single-crystal neutron diffraction*”, **Review of Scientific Instruments** **89**, 092902 (2018).
5. S. Calder, K. An, C.R. Dela Cruz, M.D. Frontzek, B. Haberl, A. Huq, S.A.J. Kimber, J.J. Molaison, J. Neufeind, K.L. Page, A.M. dos Santos, C. Tulk, M. G. Tucker, “*A Suite-level Review of the Neutron Powder Diffraction Instruments at Oak Ridge National Laboratory*”, **Review of Scientific Instruments** **89**, 092701 (2018).
6. A. M. dos Santos, J. J. Molaison, B. Haberl, L. Krishna, K. Page, M. Loguillo, X. P. Wang, “*The high pressure gas capabilities at ORNL’s neutron suite*”, **Review of Scientific Instruments** **89**, 092907 (2018).
7. T. B. Shiell, D.G. McCulloch, D.R. McKenzie, M.R. Field, B. Haberl, R. Boehler, B.A. Cook, C. de Tomas, I. Suarez-Martinez, N.A. Marks, J. E. Bradby, “*Graphitization of glassy carbon after compression at room temperature*”, **Physical Review Letters** **120**, 215701 (2018).
8. M.A. Musselman, T.M. Wilkinson, B. Haberl, C.E. Packard, “*In-situ Raman spectroscopy of pressure-induced phase transformations in DyPO₄ and Gd_xDy_(1-x)PO₄*”, **Journal of the American Ceramic Society** **101**, 2562-2570 (2018).
9. L.Q. Huston, B.C. Johnson, B. Haberl, S. Wong, J.S. Williams, J.E. Bradby, “*Thermal stability of exotic germanium phases simple tetragonal and hexagonal diamond*”, **Journal of Applied Physics** **122**, 175108 (2017).
10. B. Haberl, S. Dissanayake, F. Ye, L.L. Daemen, Y.-Q. Cheng, C.W. Li, A.-J. Ramirez-Cuesta, M. Matsuda, J.J. Molaison, R. Boehler, “*Wide-angle diamond cell for neutron scattering*”, **High Pressure Research** **37**, 495 (2017).
11. R. Boehler, J.J. Molaison, B. Haberl, “*Novel Diamond Cells for Neutron Diffraction using multi-carat CVD Anvils*”, **Review of Scientific Instruments** **88**, 083905 (2017).
12. S. Wong, B. Haberl, J.S. Williams, J.E. Bradby, “*Plastic Transformation Dependence on Initial Plastic Deformation Mode in Si via Nanoindentation*”, **Experimental Mechanics** **57**, 1037 (2017).
13. T.B. Shiell, D.G. McCulloch, J.E. Bradby, B. Haberl, R. Boehler, D.R. McKenzie, “*Nanocrystalline hexagonal diamond formed from glassy carbon*”, **Scientific Reports** **6**, 37232 (2016).
14. B. Haberl, T.A. Strobel, J.E. Bradby, “*Pathways to exotic metastable silicon allotropes*”, **Applied Physics Review** **3**, 040808 (2016).
15. E. Holmström, B. Haberl, O. H. Pakarinen, K. Nordlund, F. Djurabekova, R. Arenal, J. S. Williams, J. E. Bradby, T. C. Petersen, A. C. Y. Liu, “*Dependence of short and intermediate-range order on preparation in experimental and modeled pure a-Si*”, **Journal of Non-Crystalline Solids** **438**, 26 (2016).

16. M. Kracica, C. Kocer, D. Lau, J.G. Partridge, B. Haberl, J.E. Bradby, D.R. McKenzie, D.G. McCulloch, “*The Mechanical Properties of Energetically Deposited Non-Crystalline Carbon Thin Films*”, **Carbon** **98**, 391 (2016).
17. S. Wong, B. Haberl, J.S. Williams, J.E. Bradby, “*The influence of hold time on the onset of plastic deformation in silicon*”, **Journal of Applied Physics** **118**, 245904 (2015).
18. Y.B Gerbig, C.A. Michaels, J.E. Bradby, B. Haberl, R.F. Cook, “*In situ spectroscopic study of the plastic deformation of amorphous silicon under non-hydrostatic conditions induced by indentation*”, **Physical Review B** **92**, 214110 (2015).
19. S. Wong, B. Haberl, J.E. Bradby, J.S. Williams, “*Phase transformation as the single-mode mechanical deformation of silicon*”, **Applied Physics Letters** **106**, 252103 (2015).
20. L. Rapp, B. Haberl, C. J. Pickard, J. E. Bradby, E. G. Gamaly, J. S. Williams, and A. V. Rode, “*Experimental evidence of new tetragonal polymorphs of silicon formed through ultrafast-laser-induced confined microexplosion*”, **Nature Communications** **6**, 7555 (2015).
21. P.C. Verburg, L.A. Smillie, G.R.B.E. Römer, B. Haberl, J.E. Bradby, J.S. Williams, A.J. Huis in’t Veld, “*Crystal structure of laser-induced subsurface modifications in Si*”, **Applied Physics A**, 9238, (2015).
22. M. S. R. N. Kiran, T. T. Tran, L. Smillie, B. Haberl, D. Subianto, J. S. Williams and J. E. Bradby, “*Temperature-dependent mechanical deformation of silicon at the nanoscale: Phase transformation versus defect propagation*” **Journal of Applied Physics** **117**, 205901 (2015).
23. M.S.R.N. Kiran, B. Haberl, J.E. Bradby, J.S. Williams, “*Nanoindentation of silicon and germanium*” in “*Defects in Semiconductors*”, **Semiconductors and Semimetal Vol. 91**, 165-203 (Elsevier, 2015).
24. B. Haberl, M. Guthrie, S.V. Sinogeikin, G. Shen, J.S. Williams, and J.E. Bradby, “*Thermal evolution of the metastable r8 and bc8 polymorphs of silicon*”, **High Pressure Research** **35**, 99 (2015).
25. B. Haberl, M. Guthrie, B.D. Malone, J.S. Smith, S.V. Sinogeikin, M.L. Cohen, J.S. Williams, G. Shen, and J.E. Bradby, “*Controlled formation of metastable germanium*”, **Physical Review B** **89**, 144111 (2014).
26. S. Deshmukh, B. Haberl, S. Ruffell, P. Munroe, J.S. Williams, and J.E. Bradby, “*Phase transformation pathways in amorphous germanium under indentation pressure*”, **Journal of Applied Physics** **115**, 153502 (2014).
27. L. Rapp, B. Haberl, J.E. Bradby, E.G. Gamaly, J.S. Williams, and A.V. Rode, “*Ultrafast Laser Induced Confined Microexplosion: A New Route to Form Super-Dense Material Phases*” in “*Fundamentals of Laser-Assisted Micro- and Nanotechnologies*”, **Springer Series in Materials Science** **195**, pp 3-26 (2014).
28. M.S.R.N. Kiran, B. Haberl, J.S. Williams, and J.E. Bradby, “*Temperature dependent deformation mechanisms in pure amorphous silicon*”, **Journal of Applied Physics** **115**, 113511 (2014).
29. L. Rapp, B. Haberl, J. E. Bradby, E. G. Gamaly, J. S. Williams, and A. V. Rode, “*Confined microexplosion induced by ultra-short laser pulse at SiO₂/Si interface*”, **Invited Paper in Applied Physics A** **114**, 33 (2014).
30. L. Rapp, B. Haberl, J.E. Bradby, E.G. Gamaly, J.S. Williams, S. Juodkasis, and A.V. Rode, “*Selective localised modifications of silicon crystal by ultrafast laser induced micro-explosion*”, in “*LAMOM XVIII*”, **Book Series: Proceedings of SPIE Vol. 8607** (The International Society for Optical Engineering, Bellingham, 2013) p. 86070H.
31. L. Rapp, B. Haberl, J.E. Bradby, E.G. Gamaly, J.S. Williams, S. Juodkasis, and A.V. Rode, “*Evidence of New High-Pressure Silicon Phases in Fs-Laser Induced Confined Microexplosion*”, in “*CLEO 2013*”, **OSA Technical Digest** (online) (Optical Society of America, 2013), paper CM2M.3.
32. B. Haberl, M. Guthrie, D.J. Sprouster, J.S. Williams and J.E. Bradby, “*New insight into pressure-induced phase transitions of amorphous silicon: The role of impurities*”, **Journal of Applied Crystallography** **46**, 758 (2013).

33. J.S. Williams, B. Haberl, S. Deshmukh, B.C. Johnson, B.D. Malone, M.L. Cohen, and J.E. Bradby, “Hexagonal germanium formed via a pressure-induced phase transformation of amorphous germanium under controlled nanoindentation”, **Physica Status Solid - Rapid Research Letters** **7**, 758-768 (2013).
34. L.B. Bayu Aji, S. Ruffell, B. Haberl, J.E. Bradby, and J.S. Williams, “Correlation of indentation-induced phase transformations with the degree of relaxation of ion-implanted amorphous silicon”, **Journal of Materials Research** **28**, 1056 (2013).
35. B.C. Johnson, B. Haberl, S. Deshmukh, B.D. Malone, M.L. Cohen, J.C. McCallum, J.S. Williams, and J.E. Bradby, “Evidence for the R8 phase of germanium”, **Physical Review Letters** **110**, 085502 (2013).
36. B. Haberl, L.B. Bayu Aji, J.S. Williams and J.E. Bradby, “The indentation hardness of silicon measured by instrumented indentation: What does it mean?”, **Journal of Materials Research** **27**, 3066 (2012).
37. K.B. Borisenko, B. Haberl, A.C.Y. Liu, Y. Chen, G. Li, J.S. Williams, J.E. Bradby, D.J.H. Cockayne, M.M.J. Treacy, “Medium-range order in amorphous silicon investigated by constrained structural relaxation of two-body and four-body electron diffraction data”, **Acta Materialia** **60**, 359 (2012).
38. B.C. Johnson, N. Stavrias, B. Haberl, L.B. Bayu Aji, J.E. Bradby, J.C. McCallum, J.S. Williams, “Raman study on the phase transformations of the metastable phases of Si induced by indentation”, in “2012 COMMAD”, **Book Series: Conference on Optoelectronic and Microelectronic Materials and Devices**, (Institute of Electrical and Electronics Engineers, New York, 2012) p. 89.
39. S.K. Bhuyan, J.E. Bradby, S. Ruffell, B. Haberl, C. Saint, J.S. Williams and P. Munroe, “Phase stability of silicon during indentation at elevated temperature: evidence for a direct transformation from metallic Si-II to diamond cubic Si-I”, **MRS Communications** **2**, 9 (2012).
40. B. Haberl, S.N. Bogle, T. Li, I. McKerracher, S. Ruffell, P. Munroe, J.S. Williams, J.R. Abelson, and J.E. Bradby, “Unexpected short- and medium-range atomic structure of sputtered amorphous silicon upon thermal annealing”, **Journal of Applied Physics** **110**, 096104 (2011).
41. C. Sarra-Bournet, B. Haberl, C. Charles and R. Boswell, “Characterization of nanocrystalline nitrogen-containing titanium oxide obtained by N₂/O₂/Ar low-field helicon plasma sputtering”, **Journal of Physics D: Applied Physics** **44**, 455202 (2011).
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42. B.C. Johnson, B. Haberl, J.E. Bradby, J.C. McCallum, and J.S. Williams, “Temperature dependence of Raman scattering from the high-pressure phases of Si induced by indentation”, **Physical Review B** **83**, 235205 (2011).
43. N. Fujisawa, S. Ruffell, J.E. Bradby, J. S. Williams, B. Haberl, and O.L. Warren, “Understanding pressure-induced phase-transformation behaviour in silicon through in situ electrical probing under cyclic loading conditions”, **Journal of Applied Physics** **105**, 1010611 (2009).
44. B. Haberl, A.C.Y. Liu, J.E. Bradby, S. Ruffell, J.S. Williams, and P. Munroe, “Structural characterization of pressure-induced amorphous silicon”, **Physical Review B** **79** (2009) 155209.
45. S. Ruffell, B. Haberl, S. Koenig, J.E. Bradby, and J.S. Williams, “Annealing of nanoindentation-induced high pressure crystalline phases created in crystalline and amorphous silicon”, **Journal of Applied Physics** **105**, 093513 (2009).
46. S. Ruffell, J. Vedi, J.E. Bradby, J.S. Williams, and B. Haberl, “Effect of oxygen concentration on nanoindentation-induced phase transformations in ion-implanted amorphous silicon”, **Journal of Applied Physics** **105**, 083520 (2009).

47. B. Haberl, J.E. Bradby, S. Ruffell, J.S. Williams, and P. Munroe, “*Phase transformations induced by spherical indentation in ion-implanted amorphous silicon*”, **Journal of Applied Physics** **100**, 013520 (2006).
48. B. Haberl, J.E. Bradby, M.V. Swain, J.S. Williams, and P. Munroe, “*Response to ‘Comment on Phase transformations induced in relaxed amorphous silicon by indentation at room temperature’* ”, **Applied Physics Letters** **87**, 016102 (2005).
49. J.S. Williams, B. Haberl, and J.E. Bradby, “*Nanoindentation of ion implanted and deposited amorphous silicon*”, in “*Fundamentals of Nanoindentation and Nanotribology III*”, **MRS Symposia Proceedings Vol. 841** (Materials Research Society, Pittsburgh, 2005), p. R10.3.1/T6.3.1
50. B. Haberl, J E. Bradby, M.V. Swain, J.S. Williams, and P. Munroe, “*Phase transformations induced in relaxed amorphous silicon by indentation at room temperature*”, **Applied Physics Letters** **85**, 5559 (2004).