

JOHAN HEKTOR

PERSONAL DATA

DATE OF BIRTH: 30 August 1988
NATIONALITY: Swedish
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EDUCATION

FEB 2013-MAR 2019 Doctor of Philosophy in the subject Solid Mechanics
DIVISION OF SOLID MECHANICS, LUND UNIVERSITY
Thesis title: *Tin whiskers: experiments and modelling*
My research was focussed on understanding the mechanisms responsible for the formation and growth of tin whiskers in the Cu-Sn system. The research included theoretical development of models, finite element simulations, and experimental work using synchrotron x-ray diffraction and electron microscopy.
Supervisors: Matti Ristinmaa and Stephen Hall

SEP 2008-DEC 2012 Master of Science in Mechanical Engineering
LUND UNIVERSITY
Specialization: Computational Mechanics
Thesis: *Monte Carlo Simulation of Recrystallization*

WORK EXPERIENCE

FEB 2021-PRESENT Associate senior lecturer
DEPARTMENT OF MATERIALS SCIENCE AND APPLIED MATHEMATICS, MALMÖ UNIVERSITY, SWEDEN

APR 2020-JAN 2021 Application expert in image analysis
LUNARC, LUND UNIVERSITY, SWEDEN

APR 2019-MAR 2020 Postdoctoral researcher
DEUTSCHES ELEKTRONEN-SYNCHROTRON (DESY), HAMBURG, GERMANY
I worked at the Swedish high-energy materials science beamline P21.2 at the PETRA III synchrotron at DESY. My main responsibility were to implement tomography and grain resolved diffraction (3DXRD and related techniques) at the beamline. This included developing workflows for data acquisition and analysis, commissioning of equipment, and supporting users during experiments.

FEB 2013-MAR 2019 PhD student
DIVISION OF SOLID MECHANICS, LUND UNIVERSITY, SWEDEN

AWARDS AND GRANTS

| | |
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| 2021 | Vinnova: 3D mikrostrukturanalys av deformationshärdning i bergborrstift genom neutrontomografi (co-applicant) |
| 2021 | VR Röntgen-Ångström: Peering inside metal foams: Exploiting sinogram-based X-ray microscopy and CT to reveal the evolution of foam microstructure during thermomechanical loading (co-applicant) |
| 2021 | Tillväxtverket SREss3: Enabling state of the art in-situ deformation experiments for first science at ESS (co-applicant) |
| 2020 | Vinnova: 3D texture analysis for mechanical properties optimization of rolled aluminium (co-applicant) |
| 2019 | Vinnova: Analysis of strain age cracking using tomography and 3D-XRD (co-applicant) |
| 2017 | The Sandvik award in mechanics of materials |
| 2016 | Royal Physiographic Society, travel grant |
| 2013 | SeSe, travel grant |
| 2013 - | Multiple successful beamtime applications (ESRF, PETRA III, Max IV, CHESS, ILL) |

TEACHING EXPERIENCE

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| 2021 | Involved in teaching the following courses at Malmö University: Material mechanics, Finite element method, Solid mechanics |
| 2012-2019 | Teaching assistant in the following courses at Lund University: Engineering Mechanics, Solid mechanics (basic course for mechanical engineers), Finite element method, Finite element method – nonlinear systems. Supervision of 3 master theses and 2 bachelor theses. |
| 2010-2012 | Teaching assistant, Java programming. |

PUBLIC OUTREACH

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| 2020 | PETRA III Science Seminar |
| 2019 | Interviews in Vetenskapsradion and Ny Teknik News articles in forskning.se, Vetenskapens värld (TV), Voister, Elektroniktidningen |

OTHER MERITS

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| FEB 2017-JAN 2019 | PhD student representative, board of the Department of Construction Science, Lund University |
| 2013 | Organizing Committee, Svenska Mekanikdagar |
| 2009-2012 | Math tutor, Mattecentrum Lund |

TECHNICAL SKILLS

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| PROGRAMMING LANGUAGES: | Python, Matlab, Fortran, C++ |
| IMAGE PROCESSING AND ANALYSIS: | ImageJ/Fiji, TomoPy, Fable, PyFAI, LaueTools, Paraview |
| OTHER: | L ^A T _E X, Linux, Mac OS, git, Microscopy (optical, SEM, and FIB) |

LANGUAGES

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| SWEDISH: | Native |
| ENGLISH: | Fluent |
| GERMAN: | Basic |

PUBLICATIONS

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- [1] Neding, B., Pagan, D. C., **Hektor, J.**, Hedström, P., “Formation of Dislocations and Stacking Faults in Embedded Individual Grains during In Situ Tensile Loading of an Austenitic Stainless Steel”. *Materials* 14.20 (2021), p. 5919.
 - [2] Törnquist, E., Le Cann, S., Tudisco, E., Tengattini, A., Andò, E., Lenoir, N., **Hektor, J.**, Raina, D. B., Tagil, M., Hall, S. A., “Dual modality neutron and x-ray tomography for enhanced image analysis of the bone-metal interface”. *Physics in Medicine & Biology* (2021). ISSN: 0031-9155. DOI: [10.1088/1361-6560/ac02d4](https://doi.org/10.1088/1361-6560/ac02d4). URL: <https://iopscience.iop.org/article/10.1088/1361-6560/ac02d4/pdf>.
 - [3] Stenqvist, T., **Hektor, J.**, Bylund, S., Moberg, R., Edwards, M. O., Hall, S. A., Näslund, L. Å., “3D X-Ray Diffraction Characterization of Grain Growth and Recrystallization in Rolled Braze Clad Aluminum Sheet”. *Advanced Engineering Materials* (2021). ISSN: 1438-1656.

- [4] Martell, J., Alwmark, C., Holm-Alwmark, S., Hall, S., **Hektor, J.**, Woracek, R., Helfen, L., Tengattini, A., “Neutron Tomography as a Tool for Pin-Pointing Meteoritic Components in Impactites”. *Lunar and Planetary Science Conference*, p. 2086.
- [5] Kunwar, A., **Hektor, J.**, Nomoto, S., Coutinho, Y. A., Moelans, N., “Combining multi-phase field simulation with neural network analysis to unravel thermomigration accelerated growth of Cu₆Sn₅ IMC at cold side Cu-Sn interface.” *International Journal of Mechanical Sciences* (2020), p. 105843. DOI: [10.1016/j.ijmecsci.2020.105843](https://doi.org/10.1016/j.ijmecsci.2020.105843).
- [6] Kunwar, A., Coutinho, Y. A., **Hektor, J.**, Ma, H., Moelans, N., “Integration of machine learning with phase field method to model the electromigration induced anode Cu₆Sn₅ IMC growth at Cu-Sn interface”. *Journal of Materials Science & Technology* (2020). DOI: [10.1016/j.jmst.2020.04.046](https://doi.org/10.1016/j.jmst.2020.04.046).
- [7] Henningsson, N. A., Hall, S. A., Wright, J. P., **Hektor, J.**, “Reconstructing intragranular strain fields in polycrystalline materials from scanning 3DXRD data”. *Journal of Applied Crystallography* 53.2 (2020). DOI: [10.1107/S1600576720001016](https://doi.org/10.1107/S1600576720001016).
- [8] Hegedüs, Z., Müller, T., **Hektor, J.**, Larsson, E., Bäcker, T., Haas, S., Conceição, A., Gutschmidt, S., Lienert, U., “Imaging modalities at the Swedish Materials Science beamline at PETRA III”. *IOP Conference Series: Materials Science and Engineering*. Vol. 580. 1. IOP Publishing, 2019, p. 012032. DOI: [10.1088/1757-899X/580/1/012032](https://doi.org/10.1088/1757-899X/580/1/012032).
- [9] **Hektor, J.**, Hall, S. A., Henningsson, N. A., Engqvist, J., Ristinmaa, M., Lenrick, F., Wright, J. P., “Scanning 3DXRD Measurement of Grain Growth, Stress, and Formation of Cu₆Sn₅ around a Tin Whisker during Heat Treatment”. *Materials* 12.3 (2019), p. 446. DOI: [10.3390/ma12030446](https://doi.org/10.3390/ma12030446).
- [10] **Hektor, J.**, Micha, J.-S., Hall, S. A., Iyengar, S., Ristinmaa, M., “Long term evolution of microstructure and stress around tin whiskers investigated using scanning Laue microdiffraction”. *Acta Materialia* 168 (2019), pp. 210–221. DOI: [10.1016/j.actamat.2019.02.021](https://doi.org/10.1016/j.actamat.2019.02.021).
- [11] **Hektor, J.** “Tin whiskers: experiments and modelling”. PhD thesis. Lund University, 2018. ISBN: 978-91-7753-916-2.
- [12] Athanasopoulos, S. D., Hall, S. A., Kelleher, J. F., Pirling, T., Engqvist, J., **Hektor, J.**, “Mapping Grain Strains in Sand Under Load Using Neutron Diffraction Scanning”. *Micro to MACRO Mathematical Modelling in Soil Mechanics*. Ed. by Pasquale Giovine, Paolo Maria Mariano, and Giuseppe Mortara. Cham: Springer International Publishing, 2018, pp. 23–33. DOI: [10.1007/978-3-319-99474-1_3](https://doi.org/10.1007/978-3-319-99474-1_3).
- [13] **Hektor, J.**, Marijon, J.-B., Ristinmaa, M., Hall, S. A., Hallberg, H., Iyengar, S., Micha, J.-S., Robach, O., Grennerat, F., Castelnau, O., “Evidence of 3D strain gradients associated with tin whisker growth”. *Scripta Materialia* 144 (2018), pp. 1–4. DOI: [10.1016/j.scriptamat.2017.09.030](https://doi.org/10.1016/j.scriptamat.2017.09.030).
- [14] **Hektor, J.**, Ristinmaa, M., Hallberg, H., Hall, S. A., Iyengar, S., “Coupled diffusion-deformation multiphase field model for elastoplastic materials applied to the growth of Cu₆Sn₅”. *Acta Materialia* 108 (2016), pp. 98–109. DOI: [10.1016/j.actamat.2016.02.016](https://doi.org/10.1016/j.actamat.2016.02.016).

CONFERENCE PRESENTATIONS

- [1] **Hektor, J.**, Hall, S. A., “Deformation behavior of cast iron studied on multiple length-scales”. Introducing high energy x-rays for fundamental and applied materials science (Invited). 2021.
- [2] **Hektor, J.**, Henningsson, N. A., Hall, S. A., Wright, J. P., “Novel methods for reconstructing strain fields from scanning 3DXRD data”. Technical Aspects of Synchrotron X-ray and Neutron Measurements for Diffraction Microstructure Imaging (Invited). 2020.
- [3] **Hektor, J.**, Hall, S. A., Engqvist, J., Ristinmaa, M., Lenrick, F., Wright, J. P., “Grain growth and formation of intermetallic phases around tin whiskers studied by 3D X-ray diffraction”. 14th Biennial Conference on High-Resolution X-Ray Diffraction and Imaging (XTOP). 2018.
- [4] **Hektor, J.**, Marijon, J.-B., Ristinmaa, M., Hall, S. A., Hallberg, H., Iyengar, S., Micha, J.-S., Robach, O., Grennerat, F., Castelnau, O., “Strain Field Around a Tin Whisker Studied Using Differential Aperture X-ray Microscopy (DAXM)”. 4th International Congress on 3D Materials Science (3DMS). 2018.
- [5] **Hektor, J.**, Marijon, J.-B., Ristinmaa, M., Hall, S. A., Hallberg, H., Iyengar, S., Micha, J.-S., Robach, O., Grennerat, F., Castelnau, O., “Microdiffraction Studies of the Strain Field Around Tin Whiskers”. ESRF User Meeting. 2018.
- [6] **Hektor, J.**, Marijon, J.-B., Ristinmaa, M., Hall, S. A., Hallberg, H., Iyengar, S., Micha, J.-S., Robach, O., Grennerat, F., Castelnau, O., “Differential aperture x-ray microscopy (DAXM) applied to tin whisker growth”. Svenska Mekanikdaggar. 2017.
- [7] **Hektor, J.**, Marijon, J.-B., Ristinmaa, M., Hall, S. A., Hallberg, H., Iyengar, S., Micha, J.-S., Robach, O., Grennerat, F., Castelnau, O., “3D reconstruction of the microstructure, and strain, around a tin whisker, using Differential Aperture X-ray Microscopy (DAXM)”. MAX IV Laboratory User Meeting. 2017.
- [8] **Hektor, J.**, Ristinmaa, M., Hallberg, H., Hall, S., Iyengar, S., “A Diffusion-Deformation Multiphase Field Model for Elastoplastic Materials Applied to the Growth of Cu₆Sn₅”. 12th World Congress on Computational Mechanics. 2016.

- [9] **Hektor, J.**, Ristinmaa, M., Hallberg, H., Hall, S., Iyengar, S., “A Multiphase-field Model Simulating the Growth of Intermetallic compounds; Towards a Model for Tin Whiskers”. 5th Broberg Symposium on Mechanics of Materials. 2015.
- [10] **Hektor, J.**, Ristinmaa, M., Hallberg, H., Hall, S., Iyengar, S., “A Multiphase-field Model Based on Microforce Balance Laws: Towards a Model for Tin Whisker Growth”. 9th European Solid Mechanics Conference. 2015.
- [11] **Hektor, J.**, Ristinmaa, M., Hallberg, H., Hall, S., Iyengar, S., “Phase-field modelling of intermetallic compounds in the Cu-Sn system with application to tin whisker growth”. 14th European Mechanics of Materials Conference. 2014.