Dr. Ingrid Hallsteinsen

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Nationality: Norwegian
Date of birth: 25th October 1987

Summary

EXPERIENCE

Associate professor | 2020- current| IMA-NTNU
Leader of the Pulsed Laser Deposition lab and X-ray diffraction Lab in FACET

Post Doc | 2017-2019 | Advanced Light Source – Lawrence Berkeley National Lab, California
Principal investigator of beam-time projects

EDUCATION

PhD in Electronic engineering | 2017 | IES-NTNU
Geometrical lattice engineering of oxide interfaces

Master in Nanotechnology| 2012 | NTNU

SELECTED PUBLICATIONS

Number of peer-reviewed scientific journal publications: **20 publications with 6 first author**

- Uniaxial Neel vector control in perovskite oxide thin films by anisotropic strain engineering, Phys. Rev.B, 103, 224435, (2021)
- Record thermopower found in an IrMn-based spintronic device, Nat. Commun. 11, 2023 (2020)
- Controlling spin current polarization through non-collinear antiferromagnetism, Nat. Commun. 11, 4671 (2020)
- Role of antiferromagnetic spin axis on magnetic reconstructions at the (111)-oriented La0.7Sr0.3MnO3/LaFeO3 interface, Phys. Rev. Mat 2, 084403 (2018)
- Concurrent magnetic and structural reconstructions at the interface of (111)-oriented La0.7Sr0.3MnO3/LaFeO3. Phyical Review B, 94, 201115 (2016)
- Surface stability of epitaxial La0.7Sr0.3MnO3 thin films on (111)-oriented SrTiO3. J. App. Phys 113, 183512 (2013)

TEACHING

- *TMT4245 Functional materials* 2021 Course responsible
- *TMT4515 Specialization course: Chemical methods for synthesis and characterization* 2021 Course responsible
- *TMT4166, TMT4130, TMT4320 Materials characterization, Nanomaterials* 2021-2022 Lecturer
- 200 hours *UNIPED* 2021
- Supervision of 10 masterstudents, 4 Phd, 1 Postdoc
- Neutron sommerschool, NIST, 2018, Instructor

DISSEMINATIONS

Number of presentations at international conferences: **8 invited and 24 contributed**

ONGOING PROJECTS

Designing ultra-sharp interfaces in complex oxides for antiferromagnetic spintronics Internal funding (SO)

Band-engineering of double perovskites for solar cells- FME SuSoltech, Norwegian Research Council

Heterostructure optimization and novel epitaxy yielding chalcogenide-oxide magnetic bilayers (HONEYCOMB) Young Research Talents, Norwegian Research Council (under review)

Experience

2020 – Associate Professor at FACET (functional materials and materials chemistry), Department of Material Science and Technology, Norwegian University of Science and Technology (NTNU)

- Leader of the Interface Engineering group: Pulsed Laser Deposition Lab and X-ray diffraction lab
- Research focus: using interface engineering of dissimilar materials for spintronic and energy harvesting applications
- Developing pulsed laser deposition for 2D materials

2019 – 2020 Maternity leave

2017 – 2019 Post-Doctoral fellowship in residence Advanced Light Source (ALS), Lawrence Berkeley National Lab (LBNL) and Department of Electronics and Telecommunication, Norwegian University of Science and Technology (NTNU)

- Research focus: Using anisotropic strain in oxide multilayers for antiferromagnetic properties for spintronic applications
- Developing x-ray resonant reflectometry for depth profiling of antiferromagnetic materials
- Assisting beamline scientist at BL: 4.0.2 and 6.3.1; magnetic spectroscopy and reflectometry

Education

2016 – 2017 Doctoral fellowship in residence Advanced Light Source (ALS), Lawrence Berkeley National Lab (LBNL)

- Research focus: Emergent magnetic interface properties in oxide heterostructures measured by x-ray absorption magnetic dichroism
- Assisting beamline scientist at BL: 4.0.2 and 6.3.1; magnetic spectroscopy

2012 – 2017 PhD candidate at Oxide Electronics group, Department of Electronics and Telecommunication, Norwegian University of Science and Technology (NTNU)

- Research focus: studies of how crystal symmetry influences magnetic properties at the interface of oxide thin films. In particular, growth and characterization of perovskites in the pseudo cubic (111)-orientation, which results in interfaces of hexagonal symmetry and enhanced oxygen octahedra connectivity.
- PhD thesis: I. Hallsteinsen, J. Grepstad, T. Tybell, Geometric lattice engineering of oxide interfaces, 2017
- PhD courses: Theories of science, Solid-state chemistry, Oxide heterostructures and summer school of Oxide electronics (ISOE2013).

2010 – 2011 Exchange year at Master of Nanotechnology, University of Barcelona (UB)

- Additional 20ESC in Catalan and Spanish language.

2007 – 2012 Master in Technology with specialization in Nanotechnology at Norwegian University of Science and Technology (NTNU)

- Field of study: Nanomaterials for electronic applications
- Master thesis: Hallsteinsen, I.; Boschker, J.E.; Tybell, T. Toward growth control of (111)-oriented perovskite thin films, 2012

2006 – 2007 Examen philosophicum and Examen facultatum at University of Oslo (UIO)

2003 – 2006 High school Trondheim Katedralskole

- General studies with specialization in mathematics, physics and chemistry.

Projects and funding

2022 NTNU Roadmap for infrastructure
- **Status: under review**
- *Title: X-ray research Laboratories at NTNU*
- Co-PI with X-ray group at Department of Physics, NTNU
- Integrating all X-ray characterization under one umbrella for synergies and knowledge transfer and more efficient use of instruments

2022 NTNU Nano Impact fund
- **Status: successful**
- Promotion of material characterizaton labs for Nanomaterials

2022- 2026 NTNU Enabling technologies Nanotechnology
- ***Status:* successful*, ongoing***
- *Title: Enabling nanoscale in-operando studies of advanced epitaxial functional thin film materials using advanced nanofabrication*
- Co-PI with Magnus Nord
- 1 PhD on developing a universial technique for in-situ planeview samples for magnetic characterization in TEM

2022 Researcher project from Norwegian Research Council
- **Status: under review**
- *Title: SURF - Piezoelectric Implants under Physiological Conditions: The Role of Surface Chemistry on Material Stability and Functionality*
- Co-Principle Investigator
- Pulsed laser deposition growth of ceramics on metals for a use as a bio-implant material

2021- 2025 Young Researcher Talent from Norwegian Research Council
- ***Status:* successful*, ongoing***
- *Title: Heterostructure optimization and novel epitaxy yielding chalcogenide-oxide magnetic bilayers (HONEYCOMB)*
- Principal Investigator
- Investigate interface engineering between dissimilar materials; complex oxides and 2D chalcogenides.

2021, 2022 AVIT – Internal funding for equipment
- ***Status: not funded***
- *Title: Røntgendiffraksjon av tynne filmer og teksturerte materialer*
- Principal Investigator
- Novel 4-circle goniometer for x-ray diffraction of thin films

2021 Researcher project for convergence of technology by Norwegian Research Council
- **Status: not funded**
- *Title: Thermodynamic modeling of interfaces between dissimilar materials*
- Co-Principle Investigator
- Understanding the thermodynamic conditions for growth during pulsed laser deposition

2021 Researcher project from Norwegian Research Council
- **Status: not funded**
- Title: Solar to Hydrogen through PV-PEC Tandem Device
- Project partner

- Using Pulsed laser deposition for material fabrication

2021-2025 FME Susoltec from Norwegian Research Council

- **Status: successful, ongoing**
- *Title: Band-engineering of double perovskites for solar cells*
- My role is project partner (I was not part of application process)
- Investigate band engineering of double perovskites for novel, sustainable intermediate band solar cells

2021-2025 SO PhD candidate

- **Status: ongoing**
- *Title: Designing ultra-sharp interfaces in complex oxides for antiferromagnetic spintronics*
- Principal Investigator
- Investigate anisotropic strain in complex oxides for control of magnetic spin structure

2017-2019 Synchrotron proposal

- **Status: successful, resulted in 4 publications, 1 under preparation**
- *Title: Tailoring the magnetic anisotropy of interface reconstructions in (111)-oriented complex oxides*
- Principal Investigator

2018-2019 Synchrotron proposal

- **Status: successful, resulted in 2 publications under preparation**
- *Title: Depth resolved measurements of the antiferromagnetic spin axis in (111)-oriented oxides*
- Principal Investigator

2017-2020 Neutron proposal,

- **Status: successful, resulted in 3 publications**
- *Title: Tailoring the magnetic anisotropy by strain in AF/FM reconstructed (111)-oriented complex oxides*
- Principal Investigator

Teaching

2022 TMT4301 Materialcharacterization

- 50% of lectures
- 60-80 3rd and 4th year students from material science

2022 TMT4166 Experimental material and electro characterization

- 2 lectures on XRD
- 20-30 4th year students from material science

2021/2022 200h UNIPED

- Project: How to integrate sustainability in technological courses?

2021 TMT4320 Nanomaterials

- 30% of lectures
- 20-30 4th year students from nanotechnology and material science

2021 Course Responsible TMT4515 Specialization course for nanotechnology: Materials

- Collaborative lab-intensive course with the aim to familiarize the students at NTNU Nanolab (cleanroom)
- Responsible for lectures, learning sequences, projects and evaluation
- 20-30 5th year students from nanotechnology

2021 Course Responsible TMT4245 Functional Materials

- 50% lectures
- Responsible for feedback, projects, exams and grading
- 20-30 4th year students from nanotechnology, material science, chemistry, physics, electronics

2019 Invited lecturer at UC Davis, in the graduate course of Functional Materials

- Title: "Using neutrons and x-rays for thin film characterization"

2018 Invited lecturer and instructor at Neutron Summer School at National Institute of Science and Technology (NIST)

- 2 week intensive summer school with lectures and experimental project

2017 Invited guest lecture in 1st year undergraduate electronics course

- Title: "is germanium the next silicon?"

2012 – 2014 Teaching assistant

- Electronic circuits course for undergraduate students, responsible for the organization of the course, the homework assignments, the organization of the lab, the other teaching assistants and making and grading midterms and exams
- Nano electronics course for graduate students, responsible of the homework assignments, the final presentations, grading the exams and teaching guest classes

Supervising

2021 - 2025 Main supervisor of PhD-candidates

- Liu, Y: *Designing ultra-sharp interfaces in complex oxides for antiferromagnetic spintronics*
- Brozowski, D: *PLD deposition and emergent magnetism of van-der-Waals material/(111)-perovskite heterostructures*
- Finnseth, Ø: *Emergent magnetic topological insulator at the interface of Bi_2Te_3 and complex oxides*

2021 - 2025 Co-supervisor of PhD-candidates

- Linnerud, M: *Enabling nanoscale in-operando studies of advanced epitaxial functional thin film materials using advanced nanofabrication*
- Kelly, M: *Sustainable antifouling coatings for fish farms*

2021-2022 Main supervisor of Master students

- Strømme Falck, A.: *Pulsed laser growth of La2NiMnO6 for intermediate band solar cells*
- Rogde, V: *Low temperature microwave synthesis of ternary-layered 2D BiOCl cystals in confined space*
- Kuvshinov, M: *Synthesis and characterization of NiMo for efficient hydrogen production from water electrolysis*
- Joseph, L*: Pulsed laser deposition of double perovskite thin films on (111)-oriented SrTiO3 for solar cell applications*

2020-2022 Co-supervisor of Master students

- Bjaanes, T: *Epoxy based antifouling coatings with addition of graphene and graphene oxide*
- Kyllingstad, M: *Coatings with anti-fouling properties*

2017-2019 Main Supervisor of summer internship

- Derek, R: *Magnetic simulation of interfaces*

2016 - 2020 Assistant Supervisor of PhD candidates

- Kjærnes, K. *Anisotropic strain of complex oxides*
- Bolstad, T. *Synthesis and characterization of (111)-oriented perovskite oxide heterostructures*

2012 – 2015 Co-Supervisor of master students

- Wasvik, J.V *Initial growth of $LaFeO_3$ on (111)-oriented substrates*
- Dahl-Hansen, R. P. *Growth and strain Relations in (001)-oriented ferroelectric and ferromagnetic perovskite oxide thin film*
- Engh, M. *Synthesis and characterization of magnetic $LaSrMnO_3$ thin films on $SrTiO_3$ substrate, with $BaTiO_3$ buffer and constraining interfaces, on crystallographic (111)-oriented surfaces*
- Olsen, F. K. *Characterization of magnetic properties in (111)-oriented functional interfaces based on complex oxides*

Lab responsible

2021 - Scientific responsible at NTNU in-house laboratory facilities: responsible for strategic and financial, development and maintenance

- Pulsed laser deposition lab
- Chemical room
- X-ray diffraction user facility

2016 - 2019 Beamline assistant: responsible for training new and returning users at beamline 4.02 and 6.3.1 at Advanced Light Source (ALS).

2012 – 2015 Superuser at NTNU in-house laboratory facilities: responsible for maintenance, development, repairs, and training of new users. Responsible for health and safety at the lab.

- Pulsed laser deposition lab
- Atomic force microscope
- X-ray diffraction for thin films chamber
- Vibrating sample magnetometer

Technical Skills

Film deposition and characterization

- Pulsed Laser Deposition (PLD)
- Scanning Probe Microscopy,
- Atomic Force Microscopy (AFM),
- X-ray diffraction (XRD),
- Scanning Electron Microscopy (SEM),
- Mass spectroscopy,
- Vibrating Sample Magnetometry (VSM),
- E-beam lithography and pre/post-processing

- Chemical vapor deposition (CVD)
- Clean room training

Synchrotron techniques

- X-ray resonant reflectometry at Advanced Light Source, Lawrence Berkeley National Lab.
- X-ray resonant scattering at Advanced Light Source, Lawrence Berkeley National Lab.
- X-ray magnetic circular/linear dichroism with photoemission electronic microscopy at Swiss light source, Paul Scherrer Institute and Advanced Light Source, Lawrence Berkeley National Lab.
- X-ray magnetic circular/linear dichroism spectroscopy at MaxLab, Lund University, Lund Sweden, and Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA.
- Infra-red spectroscopy at Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA.

Neutron techniques

- Neutron reflectometry at Center for Neutron Research, National Institute of Science and Technology (NIST), Gaithersburg, MD.
- Neutron scattering at Center for Neutron Research, National Institute of Science and Technology (NIST), Gaithersburg, MD.

Organizational Activities

2022-2023	Organizer of Focus Session American Physical Society
2022-2026	Outstanding Academic Fellow NTNU
2022	Administrator PhD defense: Erik Rhoede
2021	National Coordinator COST action OPERA – European network for Innovative and Advanced Epitaxy
2021	Administrator PhD defense: Asmira Delic
2021	Administrator and committee member of expert hiring panel for associate professor
2021	Committee member for hiring in 4 processes
2018 - 2019	Organizer of the PhD and Postdoc safety meeting at ALS
2018	Session chair ALS user meeting, Berkeley, USA
2018	Session chair International conference on magnetism, San Francisco, USA
2017 - 2019	Member of the post-doc pilot at NTNU
2017	Session chair ALS user meeting, Berkeley, USA
2016 - 2019	Experimental Leader and writer of proposals to ALS and NIST with awarded beamtime every cycle
2012 – 2017	Ambassador from the department of electronic systems, NTNU, towards students in several events promoting research as a career
2014	Conference assistant Material Research Society Spring Meeting, San Francisco, USA
2007 – 2010	Executive board member of the Student Organization for Nanotechnology (TIMINI) and organizer of educational excursion to China

Awards, minor grants and disseminations

Research grants

- $20,000 for promotion of PLD/XRD lab from NTNU impact fund
- $5,000 as international mobility stipend for post-docs, 2018
- $10,000 in support of research in the USA, Scandinavian Foundation, 2016.

Awards

- Department of Electronic Systems Best ambassador award 2017
- Neville B. Smith Award for 1st place in the ALS Student Poster competition: I. Hallsteinsen et al. *Induced ferromagnetism at the interface of complex oxides*, oct 3-4, 2016, Berkeley, CA
- Best Poster award; T. Bolstad, K. Raa, I. Hallsteinsen, M. Engh, J. Grepstad, T.Tybell, *(111)-oriented $BaTiO_3$/ $La_{0.7}Sr_{0.3}MnO_3$ thin film heterostructures*, European Material Research Society (EMRS), May 11-15, 2015, Lille, France
- Best Poster award: F.K. Olsen, I. Hallsteinsen, T. Tybell, *Impact of interface coupling in magnetic oxide heterostructures*, Nanolab workshop, Nov. 1-2, 2015, Trondheim, Norway

Disseminations

- Welcome to new Nanostudents; 2021 and 2022
- Video-presentation Grey Goo symposia 2021
- Eductional YouTube video on Oxides. Channel: Møt NTNU. Title: Ingrid gror perovskitt-tynnfilmer. June 1, 2015.

Selected Collaborations

Assoc. Prof Magnus Nord, NTNU:
Expert in (S)TEM and valuable collaborator, we did our PhDs together and has since then collaborated on a number of projects, lastly providing samples for magnetic imaging in TEM.

Oxide Electronics lab, NTNU:
My former group and a natural collaborator. At the moment I have a joint project with Assoc. Prof. Erik Folven on providing samples for STXM, magnetic dynamic imaging.

Prof. Justin Wells, UIO/QuSpin NTNU:
I reached out to prof Wells in regard to HONEYCOMB project which he was interested in, and if successful we will initiate a project measuring ARPES at oxide surfaces.

Dr. Alexander Grutter, NIST:
We first did measurements together in 2016, and we have since kept close contact – with all my projects involving neutron measurements, as well as me assisting in measurements at the advanced light source.

Prof. Dustin Gilbert, University of Tennessee:
We first did measurements together in 2016 at NIST, and continued the collaboration through numerous measurements at the advanced light source. We are now initiating a new project on topological magnetic features in complex oxides.

Prof. Kumah, North Carolina State University:
We have done measurements together at the advanced light source and keep in contact for mutual interest.

Prof. Takamura, UC Davis:

A collaboration initiated from my former group, but developed as I was at the advanced light source. Now functions as a mentor and collaborator in different projects.

Prof Wang, UCLA:
I visited Prof Wang in 2016 for initating a project with 2D materials on top of complex oxides. Though that project did not result in any publications, we have remained in contact and he functions as an expert for future projects.

Ass. Prof. Al Balushi, UC Berkeley:
We have a shared project student on fabrication of 2D materials at low temperature.

References

Elke Arenholz, ea427@cornell.edu
Thomas Tybell, thomas.tybell@ntnu.no
Brian Kirby, briankirby@nist.org
Mari-Ann Einarsrud, mari-ann.einarsrud@ntnu.no

Publications & Presentations

Publications

- P. Quarterman, I. Hallsteinsen, M. Dunz, M. Meinert, E. Arenholz, J. A. Borchers, A.J. Grutter, *Effects of field annealing on MnN/CoFeB exchange bias systems,* Phys. Rev. Mat. (2019)
- M. Nord, A. Ross, D. McGrouther, J. Barthel, M. Moreau, I. Hallsteinsen, T. Tybell, I. MacLaren, *3d sub-nanoscale imaging of unit cell doubling due to octhahedral tilting and cation modulation in strained perovskite thin films,* Phys. Rev Mat. (2019), *https://arxiv.org/pdf/1810.07501*
- S. Suraj, T. Bolstad, I. Hallsteinsen, T. Tybell, E. Wahlstrøm, *Magneto-dynamic properties of $La_{0.7}Sr_{0.3}MnO_3/SrTiO_3$ (111) probed by ferromagnetic resonance,* Appl. Phys. Lett. **114**, 222403 (2019), https://doi.org/10.1063/1.5093324
- F.K. Olsen, I. Hallsteinsen, T.Tybell, E. Arenholz, E. Folven, *Coexisting spin-flop couping and exchange bias in $LaFeO_3$/ $La_{0.7}Sr_{0.3}MnO_3$ heterostructures,* Phys. Rev. B. **99**, 134411 (2019) https://doi.org/10.1103/PhysRevB.99.134411
- A. Bang, I. Hallsteinsen, F.K. Olsen, T. Tybell, E. Arenholz, E. Folven, J. Grepstad, *Néel vector reorientation in ferromagnetic/antiferromagnetic complex oxide nanostructures*, Appl. Phys. Lett, **114,** 192403 (2019) https://doi.org/10.1063/1.5094604
- T. Bolstad, E. Lysne, I. Hallsteinsen, E. Arenholz, U. L. Österberg, T. Tybell, *Effect of (111)-oriented strain on the structure and magnetic properties of $La_{0.7}Sr_{0.3}MnO_3$ thin films,* J. Phys: Condens. Matter, **30**, 255702 (2018), http://dx.doi.org/10.1088/1361-648X/aac468
- I. Hallsteinsen, A. Grutter, M. Moreau, S.D. Slöetjes, K. Kjærnes, E. Arenholz, T. Tybell *Role of antiferromagnetic spin axis on magnetic reconstructions at the (111)-oriented $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$ interface. Phys. Rev. Materials, **2**, 084403 (2018)* http://dx.doi.org/10.1103/PhysRevMaterials.2.084403
- I. Hallsteinsen, M. Moreau, R. V. Chopdekar, E. Christiansen, M. Nord, P.E. Vullum, J. Grepstad, R. Holmestad, S.M. Selbach, A. Scholl, E. Arenholz, E. Folven, T. Tybell *Magnetic domain configuration of (111)-oriented $LaFeO_3$ epitaxial thin films. APL Materials, **5**, 086107 (2017)* http://dx.doi.org/10.1063/1.4986555
- I. Hallsteinsen, M. Moreau, A. Grutter, M. Nord, P.E. Vullum, D. Gilbert, T. Bolstad, J. Grepstad, R. Holmestad, S.M. Selbach, A.T. N'Diaye, B.J. Kirby, E. Arenholz, T. Tybell *Concurrent magnetic and structural reconstructions at the interface of (111)-oriented $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$. Phys. Rev. B, **94**, 201115 (2016)* http://dx.doi.org/10.1103/PhysRevB.94.201115
- I. Hallsteinsen, M. Nord, T. Bolstad, P.E. Vullum, J.E. Boschker, P. Longo, R. Takahashi, R. Holmestad, M. Lippmaa, T. Tybell. *Effect of polar (111)-oriented $SrTiO_3$ on initial perovskite growth*, Cryst. Growt & Des, **16**, 2537 (2016) http://dx.doi.org/10.1021/acs.cgd.6b00143
- M. Nord, P.E. Vullum, I. Hallsteinsen, T. Tybell, R. Holmestad. *Assessing electron beam sensitivity for $SrTiO_3$ and $La_{0.7}Sr_{0.3}MnO_3$ using electron energy loss spectroscopy*, Ultramicroscopy **169**, 98 (2016) http://dx.doi.org/10.1016/j.ultramic.2016.07.004
- M. Nord, A. Ross, I. Hallsteinsen, T. Tybell, I. MacLaren. *Towards mapping perovskite oxide 3D Structure using two-dimensional pixelated STEM detector*, Microsc. Microanal. **22**, (2016) http://dx.doi.org/10.1017/S1431927616003238
- V. Flovik, F. Macià, S. Lendínez, J.M. Hernàndez, I. Hallsteinsen, T. Tybell, E. Wahlström. *Thickness and temperature dependence of the magnetodynamic damping of pulsed laser deposited $La_{0.7}Sr_{0.3}MnO_3$ on (111)-oriented $SrTiO_3$*, J. of Mag. And Mag. Mat. **420**, 280 (2016). http://dx.doi.org/10.1016/j.jmmm.2016.07.028
- I. Hallsteinsen, E. Folven, F.K. Olsen, R.V. Chopdekar, M. Rzchowski, C.B. Eom, J. Grepstad, T. Tybell. *Crystalline symmetry controlled magnetic switching in epitaxial (111) $La_{0.7}Sr_{0.3}MnO_3$*

thin films. APL Mat. **3**, 062501 (2015). http://dx.doi.org/10.1063/1.4907877

- E. Christiansen, M. Nord, I. Hallsteinsen, P.E. Vullum, T. Tybell, R. Holmestad. *Structural investigation of epitaxial $LaFeO_3$ thin films on (111) oriented $SrTiO_3$ by transmission electron microscopy*, Journal of Physics: Conference Series, (2015). http://dx.doi.org/10.1063/1.4804312
- I. Hallsteinsen, J.E. Boschker, M. Nord, S. Lee, M. Rzchowski, P.E. Vullum, J. Grepstad, R. Holmestad, C.B. Eom, T. Tybell. *Surface stability of epitaxial $La_{0.7}Sr_{0.3}MnO_3$ thin films on (111)-oriented $SrTiO_3$.* J. Appl. Phys. **113,** 183512 (2013). http://dx.doi.org/10.1063/1.4804312
- I. Hallsteinsen, P. Shafer, E. Arenholz, *X-ray resonant reflectometry probes antiferromagnetic depth dependence of 111)-oriented $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$ epitaxial thin films,* under preparation
- I. Hallsteinsen, K. Kjærnes, A. Grutter, P. Quarterman, R.V Chopdekar, E. Arenholz, T. Tybell, Engineering of a switchable bistate antiferromagnetic Néel vector by interface design in epitaxial thin films*,* under preparation
- K. Kjærnes, I. Hallsteinsen, A. Grutter, E. Arenholz, T. Tybell, *Anisotropic interface magnetism in complex oxides under strain,* under preparation
- A. Bang, I. Hallsteinsen, F.K. Olsen, T. Tybell, E. Arenholz, R.V. Chopdekar, E. Folven, J. Grepstad, *Exploring shape-imposed antiferromagnetic domain patterns in complex oxide nanostructures*, under preparation
- S. Tu, T. Ziman, G.cYu, C. Wan, J. Hu, H. Wu, H. Wang, M. Liu, C. Liu, C. Guo, J. Zhang, M. A. Cabero, Y. Zhang, P. Gao, D. Yu, X. Han, I. Hallsteinsen, D. A. Gilbert, K. L. Wang, J.-P. Ansermet, S. Maekawa and H. Yu *Giant thermoelectric power in IrMn-based nanostructures near the antiferromagnetic phase transition*, under preparation.

Invited presentations

- I. Hallsteinsen, *Engineering antiferromagnetic spin structures through novel epitaxial interfaces,* International union of materials research societies, International Conference of Young Researchers on Advanced Materials, 3-6th august 2022
- I. Hallsteinsen, *Interface engineering by Pulsed Laser Deposition of novel oxide heterostructures*, Norsk Kjemisk Selskap fagruppe for uorganisk kjemi, NKS-FUM, 1st nov, 2021
- I Hallsteinsen, *Complex oxides for intermediate band solar cells*, SuSoltech annual meeting, 30th august 2021
- I. Hallsteinsen. *Using x-rays and neutrons to probe magnetism in complex oxides, Lecture in Functional Materials,* UC Davis, March 4th, 2019
- I. Hallsteinsen, K. Kjærnes, S. Sloetjes, M. Moreau, A. Grutter, M.Nord, D. A. Gilbert, J. K. Grepstad, R. Holmestad, S. M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *Combining x-rays and neutrons to study oxide interface effects,* NCNR summer school, June 20-25, 2018, Gaithersburg, NIST
- I. Hallsteinsen, K. Kjærnes, S. Sloetjes, M. Moreau, A. Grutter, M.Nord, D. A. Gilbert, J. K. Grepstad, R. Holmestad, S. M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *Controlling interface magnetism in complex oxides,* University of Utah seminar, April 6th, 2018, Salt Lake City, USA
- I. Hallsteinsen, K. Kjærnes, S. Sloetjes, M. Moreau, A. Grutter, M.Nord, D. A. Gilbert, J. K. Grepstad, R. Holmestad, S. M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *Controlling magnetic spin reconstructions by geometrical lattice engineering,* Conference of electronic and advanced materials, Jan 15-17, 2018, Orlando, USA
- I. Hallsteinsen, K. Kjærnes, S. Sloetjes, M. Moreau, A. Grutter, M.Nord, D. A. Gilbert, J. K. Grepstad, R. Holmestad, S. M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *Magnetic*

anisotropy of interface induced ferromagnetism in (111) $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$ epitaxial thin films, ALS users meeting, Oct 3-4, 2017, Berkeley, ALS

- I. Hallsteinsen, K. Kjærnes, S. Sloetjes, M. Moreau, A. Grutter, M.Nord, D. A. Gilbert, J. K. Grepstad, R. Holmestad, S. M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *Induced ferromagnetism in oxides by geometrical lattice engineering,* NCNR seminar, May 17th, 2017, Gaithersburg, NIST
- I. Hallsteinsen, M. Moreau, A. Grutter, M.Nord, P-E. Vullum, D. A. Gilbert, J. K. Grepstad, R. Holmestad, S. M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *Complex magnetic reconstructions at the interface of (111)-oriented oxides*. ALS seminar, Dec 15th, 2016, Berkeley, ALS
- I. Hallsteinsen, M. Moreau, A. Grutter, M.Nord, P-E. Vullum, D. A. Gilbert, J. K. Grepstad, R. Holmestad, S. M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *Induced ferromagnetism at the interface of complex oxides*. University of California – Los Angeles , Oct 20th, 2016, Los Angeles, ALS

Contributed presentations at conference

- I. Hallsteinsen, K. Kjærnes, S. Sloetjes, M. Moreau, A. Grutter, M.Nord, D. A. Gilbert, J. K. Grepstad, R. Holmestad, S. M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *Anisotropic field control of antiferromagnetic spin axis through interface magnetism,* International conference of magnetism, July 19-21, 2018, San Francisco, USA
- I. Hallsteinsen, K. Kjærnes, S. Sloetjes, M. Moreau, A. Grutter, M.Nord, D. A. Gilbert, J. K. Grepstad, R. Holmestad, S. M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *Controlling the spin reconstruction in (111)-oriented $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$ heterostructures,* International workshop on oxides, Sept 26-29, 2017, Chicago, USA
- I. Hallsteinsen, M. Moreau, A. Grutter, M.Nord, P-E. Vullum, D. A. Gilbert, T. Bolstad, J. K. Grepstad, R. Holmestad, S. M. Selbach, A.T. N'Diaye, B. J. Kirby, E. Arenholz and T. Tybell. *Spin reconstruction as a function of thickness at the (111)-oriented $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$ interface,* Material Research Society Spring Meeting, April 3 – 5, 2017, Phoenix, USA
- I. Hallsteinsen, M. Moreau, A. Grutter, M.Nord, P-E. Vullum, D. A. Gilbert, T. Bolstad, J. K. Grepstad, R. Holmestad, S. M. Selbach, A.T. N'Diaye, B. J. Kirby, E. Arenholz and T. Tybell. *Effect of structural reconstructions at the interface of (111)-oriented $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$.* Material Research Society Fall Meeting, Nov. 27 – Dec. 2, 2016, Boston, USA
- I. Hallsteinsen, M. Moreau, A. Grutter, D. Gilbert, A. N'Diaye, B. J. Kirby, E. Arenholz and T. Tybell. *Complex magnetic interface interactions at the (111)-oriented $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$ interface.* 61st Annual Conference on Magnetism and Magnetic Materials, Oct. 31 – Nov. 4, 2016, New Orleans, USA
- I. Hallsteinsen, M. Moreau, A. Grutter, M.Nord, P-E. Vullum, D. A. Gilbert, T. Bolstad, J. K. Grepstad, R. Holmestad, S. M. Selbach, A.T. N'Diaye, B. J. Kirby, E. Arenholz and T. Tybell. *Induced ferromagnetism at the interface of complex oxides,* Advanced Light Source user meeting, Oct. 3 -4, 2016, Berkeley, USA
- A. D. Bang, S. Slöetjes, F.K. Olsen, I. Hallsteinsen, E. Folven, J. Grepstad. *Exploring ferromagnetic/antiferromagnetic coupling through magnetic domain imaging*. 7th annual Nano Network workshop, July 13-16, 2016, Trondheim, Norway
- T. Bolstad, T.Tybell, I. Hallsteinsen, *Control of magnetism by symmetry and epitaxial stacking*. 7th annual Nano Network workshop, July 13-16, 2016, Trondheim, Norway
- M. Moreau, I. Hallsteinsen, M. Nord, T. Bolstad, A. Grutter, R. Holmestad, J. Grepstad, S.M. Selbach, T. Tybell, *Structural and electronic reconstructions at (111)-oriented oxide interfaces,* Nanolab workshop, Nov. 1-2, 2015, Trondheim, Norway
- I. Hallsteinsen, F.K. Olsen, M.Nord, M. Moreau, P-E. Vullum, R. Holmestad, J. Grepstad, E. Folven, T. Tybell. *The effect of oxygen octahedral coupling in (111)-oriented $La_{0.7}Sr_{0.3}MnO_3$*

and $LaFeO_3$ epitaxial heterostructures on $SrTiO_3(111)$, European Materials Research Society (E-MRS) May 11-15, 2015, Lille, France

- I. Hallsteinsen, M. Moreau, E. Folven, J. Grepstad, M.Nord, R. Holmestad, E. T. Tybell. *Magnetic coupling in (111)-oriented $La_{0.7}Sr_{0.3}MnO_3$ and $LaFeO_3$ epitaxial heterostructures*, "To-Be" Cost Action Mar. 29 – Apr 2, 2015, Aveiro, Portugal
- M. Nord, I. Hallsteinsen, P.E. Vullum, T. Tybell, R. Holmestad, *Advanced quantitative fine structure analyzes of perovskite oxides using electron energy loss spectroscopy,* Electron Microscopy and Microanalysis Group (EMAG) June 29- July 2 2015, Manchester, England
- I. Hallsteinsen, F.K. Olsen, T. Bolstad, M. Moreau, M.Nord, R. Holmestad, J. Grepstad, E. Folven, T. Tybell. *Induced magnetism in (111)-oriented $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$ heterostructures* Nano Network 6th annual workshop, June 15-17, 2015, Oslo, Norway
- T. Bolstad, R. Takahashi, I. Hallsteinsen, M. Moreau, K.S. Raa, M. Lippmaa, J. Grepstad, T.Tybell, Structural effects on magnetism: A possible route to novel electromagnetic systems Nano Network 6th annual workshop, June 15-17, 2015, Oslo, Norway
- M. Nord, I. Hallsteinsen, P.E. Vullum, T. Tybell, R. Holmestad, *Analysing the electronic structure of perovskite oxides using Transmission Electron Microscopy*, Nano Network 6th annual workshop, June 15-17, 2015, Oslo, Norway
- E. Folven, S. Slöetjes, I. Hallsteinsen, R.V. Chopdekar, M. Lee, T. Wynn, B. Li, Y. Jia, A. Young, A. Scholl, S. Retterer, T. Tybell, Y. Takamura, J. Grepstad. *Orientation-dependent domain states in epitaxial perovskite thin film micromagnets.* 59th Annual Conference on Magnetism and Magnetic Materials, Nov. 3-7, 2014, Honolulu, Hawaii
- I. Hallsteinsen, E. Folven, F.K. Olsen, Y. Takamura, J. Grepstad, T. Tybell. *Magnetic properties of (111)-oriented superlattices of oriented $La_{0.7}Sr_{0.3}MnO_3$ and $LaFeO_3$,* Nanolab workshop Nov. 10-11, 2014, Trondheim, Norway
- M. Nord, P.E. Vullum, I. Hallsteinsen, J. Boschker, R. Holmestad, T. Tybell, *Comparison of (001) and (111) $La_{0.7}Sr_{0.3}MnO_3/SrTiO_3$ interface using TEM*, Nanolab workshop Nov. 10-11, 2014, Trondheim, Norway
- M. Nord, P.E. Vullum, I. Hallsteinsen, J. Boschker, R. Holmestad, T. Tybell, *Comparison of (001) and (111) $La_{0.7}Sr_{0.3}MnO_3/SrTiO_3$ interface using TEM*, Material Research Society spring meeting, Apr. 21-25, 2014 San Francisco
- I. Hallsteinsen, E. Folven, F.K. Olsen, Y. Takamura, J. Grepstad, T. Tybell. *Magnetic properties of (111)-oriented thin films,* Nano Network 5th annual workshop, May 16-18 2014, Tønsberg, Norway
- I. Hallsteinsen, E. Folven, R.V. Rajesh, M. Nord, E. Christiansen, P.E. Vullum, R. Holmestad, Y. Takamura, J. Grepstad, T. Tybell. Magnetic switching of epitaxial (111)-oriented $La_{0.7}Sr_{0.3}MnO_3/SrTiO_3$ thin films, Nanolab workshop Nov. 12, 2013 Trondheim, Norway
- I. Hallsteinsen, J. Boschker, M. Nord, S. Lee, M. Rzchowzki, P.E. Vullum, J. Grepstad, R. Holmestad, C.B. Eom, T. Tybell. *Controlled surfaces of (111)-oriented perovskite thin films*, *STINT Workshop on oxide and interface magnetism,* Dec. 5-6, 2012, Trondheim, Norway
- I. Hallsteinsen, J. Boschker, M. Nord, S. Lee, M. Rzchowzki, P.E. Vullum, J. Grepstad, R. Holmestad, C.B. Eom, T. Tybell *Surface stability of epitaxial $La_{0.7}Sr_{0.3}MnO_3$ thin films on $SrTiO_3$ (111), Material Research Society fall meeting,* Nov. 25-30, 2012*,* Boston, USA.
- I. Hallsteinsen, J. Boschker, M. Nord, S. Lee, M. Rzchowzki, P.E. Vullum, J. Grepstad, R. Holmestad, C.B. Eom, T. Tybell *Film growth of (111)-oriented perovskite systems*, Nanolab workshop, Dec 12. 2012, Trondheim, Norway

Poster presentations at conference

- I. Hallsteinsen, K. Kjærnes, A. Grutter, T.Bolstad, M. Moreau, S.M. Selbach, B. J. Kirby, E. Arenholz and T. Tybell. *The role of structural reconstructions and antiferromagnetic spin structures to establish interface spin textures at the (111)-oriented $La_{0.7}Sr_{0.3}MnO_3/LaFeO_3$ interface*. International workshop for oxide electronics, Sept 28-30, 2018, Switzerland

- I. Hallsteinsen, M. Moreau, A. Grutter, M. Nord, P.E. Vullum, D. Gilbert, J. Grepstad, R. Holmestad, S.M. Selbach, B.J. Kirby, E. Arenholz, T. Tybell *Magnetic spin reconstruction in (111)-orieted oxide thin films,* Advanced Light Source cross-cutting review, Jan. 23 -42, 2018, Berkeley, USA
- I. Hallsteinsen, M. Moreau, A. Grutter, M. Nord, P.E. Vullum, D. Gilbert, T. Bolstad, J. Grepstad, R. Holmestad, S.M. Selbach, A.T. N'Diaye, B.J. Kirby, E. Arenholz, T. Tybell *Induced ferromagnetism at the interface of complex oxides,* Advanced Light Source user meeting, Oct. 3 -4, 2016, Berkeley, USA
- F.K. Olsen, I. Hallsteinsen, T. Tybell, *Impact of interface coupling in magnetic oxide heterostructures*, Nanolab workshop, Nov. 1-2, 2015, Trondheim, Norway
- T. Bolstad, R. Takahashi, I. Hallsteinsen, M. Moreau, K.S. Raa, M. Lippmaa, J. Grepstad, T.Tybell, *Structural coupling in (111)-oriented $BaTiO_3/La_{0.7}Sr_{0.3}MnO_3$ thin film heterostructures on $SrTiO_3$,* International School of Oxide Electronics, Oct. 12-24, 2015, Cargese, Corse
- T. Bolstad, K. Raa, I. Hallsteinsen, M. Engh, J. Grepstad, T.Tybell, *(111)-oriented $BaTiO_3/La_{0.7}Sr_{0.3}MnO_3$ thin film heterostructures*, European Material Research Society (EMRS), May 11-15, 2015, Lille, France
- E. Christiansen, M. Nord, I. Hallsteinsen, P.E. Vullum, T. Tybell, R. Holmestad. *Structural investigation of epitaxial $LaFeO_3$ thin films on (111) oriented $SrTiO_3$ by transmission electron microscopy*, Electron Micropscopy and Microanalysis Group, June 29- July 2, 2015, Manchester, England
- I. Hallsteinsen, M. Nord, M. Moreau, A. Grutter, F.K. Olsen, T. Bolstad, P.E. Vullum, E. Folven, J. Grepstad, R. Holmestad, T. Tybell, *Emerging Magnetism at the Interface of (111)-Oriented Epitaxial Ferromagnetic $La_{0.7}Sr_{0.3}MnO_3$ and Antiferromagnetic $LaFeO_3$*, Material Research Society fall meeting, Nov. 29 – Dec. 4, 2015, Boston, USA.
- I. Hallsteinsen, F.K. Olsen, R.V. Chopdekar, E. Folven, J. Grepstad, T. Tybell. *Imaging magnetic anisotropy, domain structure, and local reversal mechanisms in magnetic thin films*. Norwegian Synchrotron and Neutron meeting Jan. 19-20, 2015, Stavanger, Norway
- J. Grepstad, E. Folven, R.V. Chopdekar, S. Slöetjes, I. Hallsteinsen, M. Lee, T. Wynn, B. Li, Y. Jia, A. Young, A. Scholl, S. Retterer, T. Tybell, Y. Takamura. *Vortex domains in perovskite oxide thin film micromagnets; dependence on temperature, crystalline orientation, and interlayer exchange interactions*, Norwegian Synchrotron and Neutron meeting Jan. 19-20, 2015, Stavanger, Norway
- I. Hallsteinsen, M. Nord, E. Folven, M. Moreau, F.K. Olsen, P.E. Vullum, R.V. Chopdekar, S.M. Selbach, M. Rzchowski, C.B. Eom, J. Grepstad, R. Holmestad, T. Tybell, *Effect of crystalline symmetry in $La_{0.7}Sr_{0.3}MnO_3$: (111)-oriented vs (001)-oriented epitaxial thin films*. International Workshop on Oxide Electronics, Sep. 28- Oct 1, 2014, New York, USA
- I. Hallsteinsen, E. Folven, M. Nord, F.K. Olsen, E. Christiansen, Y. Takamura, R. Holmestad, J. Grepstad, T. Tybell, *Magnetic properties and exchange mechanisms in epitaxial (111)-oriented magnetic heterostructures* Material Research Society spring meeting, Apr. 21-24, 2014, San Francisco, USA
- E. Folven, I. Hallsteinsen, R.V. Chopdekar, A. Young, M. Marcus, S. Retterer, T. Tybell, Y. Takamura, H. Gomonay, J. Grepstad *Shape Effects in Antiferromagnetic Nanostructures*, Material Research Society spring meeting, Apr. 21-24, 2014, San Francisco, USA
- I. Hallsteinsen, E. Folven, R.V. Chopdekar, Y. Takamura, J. Grepstad, T. Tybell. *Synthesis and magnetic switching of epitaxial (111)-oriented $La_{0.7}Sr_{0.3}MnO_3$ thin films*, Material Research Society fall meeting, Dec. 2- 5, 2013 Boston, USA
- I. Hallsteinsen, E. Folven, R.V. Chopdekar, M. Rzchowski, M. Lippma, C.B. Eom, Y. Takamura, J. Grepstad, T. Tybell. *(111)-oriented epitaxial thin films: synthesis and magnetic properties of $La_{0.7}Sr_{0.3}MnO_3/SrTiO_3(111$*), International school of oxide electronics, Sept. 12-24, 2013, Cargese, Corse