

## Curriculum vitae of Ole Martin Løvvik

Born 09.04.1968 in Trondheim, Norway. Male, married since 1993, 3 children (born in 1996, 1999 and 2003, parental leaves in total 14 months). Norwegian citizen. E-mail: ole.martin.lovvik@sintef.no, Tel. +47 93015091. Present positions: Senior scientist, SINTEF Materials and Chemistry; Adjunct professor, Dept. of Physics, University of Oslo.

### Academic degrees

- Dr.scient. in energy physics, Dept. of Physics, Univ. of Oslo, June 1998. Title of thesis: Hydrogen on a Palladium Surface: Potential Energy Surfaces and Quantum Dynamical Calculations.
- Cand.scient. in theoretical physics, Dept. of Physics, Univ. of Oslo, Jan. 1993. Title of thesis: On Maxwell-Chern-Simons-theory.

### Work experience

- Visiting professor, Osaka University, Japan, 2012. (1 month.)
- Adjunct Professor, Dept. of Physics, Univ. of Oslo, 2012– . (Present)
- Senior Scientist, SINTEF Materials and Chemistry, Synthesis and Properties, 2011– . (Present)
- Research Scientist, SINTEF Materials and Chemistry, Synthesis and Properties, 2008– 2011.
- Adjunct Associate Professor, Dept. of Physics, Univ. of Oslo, 2008–2011.
- Visiting scientist, Univ. of Hiroshima, Japan, 2008. (1 month.)
- University lecturer, Dept. of Physics, Univ. of Oslo, 2007–2008.
- Research fellow, Institute for Energy Technology, Kjeller, Norway, 2006–2008.
- Consultant, Norwegian Research Council, 2006. (Together about 4 months.)
- Research fellow, Centre for Materials Science and Nanotechnology, Univ. of Oslo, 2004–2008.
- Post doc., Dept. of Physics, Univ. of Oslo and Institute for Energy Technology, 2002–2003.
- Associate Professor, Norwegian Univ. of Life Sciences, 2001.
- Post doc., Dept. of Physics, Univ. of Oslo, 1999–2001.
- Civil service as musician, Nordreisa, Norway, 1998–1999.
- Doctoral scholarship, Dept. of Physics, Univ. of Oslo, 1993–1998.
- Teaching beginner's courses and PhD courses, Dept. of Physics, Univ. of Oslo, 1992–1995.
- Freelance musician, several tours, Rikskonsertene, 1994–1996. (Together about 6 months.)
- Composer and text writer. Among other things, the musical "Vasshullets herrer", 1996 and 2008.

### Fields of interest and present professional activities

- Scientific tools: Electronic structure calculations, density functional theory, thermodynamics, kinetics, crystal structures, electronic band structure.
- Materials systems: solar cells, thermoelectricity, hydrogen storage, hydrogen permeable membranes, proton conducting oxides, carbon nanomaterials, heterogeneous catalysis.
- Administration: Project proposals, strategy processes, research management (participation in and management of more than 15 projects > 1 MNOK).
- Extensive experience within teaching and communication of results.

### Commissions of trust

- National expert in the COST Domain committee on Materials, Physics, and Nanoscience. (European Science Foundation), 2008–2010.

- Norwegian representative in the NORDIC-US Cooperation on Renewable Energy (NUCORE) initiative, which aimed to introduce a new multilateral cooperation scheme between USA and the Nordic countries, 2008.
- Member of board, Norwegian Physical Society, 2006–2009.
- Leader of the Condensed Matter Physics with Atomic Physics Division of the Norwegian Physical Society, 2006–2009.
- Secretary writing the National Strategy for Nanoscience and Nanotechnology, Research Council of Norway, 2006.
- Member of project group writing the foresight study Energy 2020+, Research Council of Norway, 2004–2005.
- Member of project group writing national strategic document on hydrogen technology, FUNMAT, 2003.
- Member of project group and executive group, writing the strategy for Dept. of Physics, Univ. of Oslo, 2002–2003.
- Member of the executive committee and of the board, Dept. of Physics, Univ. of Oslo, 2001–2003.
- Member of a committee at the Univ. of Oslo writing a statement about the Energy Research administrated by the Research Council of Norway, 1999.
- Member of the council, Dept. of Physics, Univ. of Oslo, 1996–1997.
- Member of the committee for studies and teaching, Dept. of Physics, Univ. of Oslo, 1994–1997.
- Secretary for the Hydrosol Oslo-Kjeller initiative (coordination of hydrogen and solar energy related research in the Oslo area), 1994–1998.
- Member of the board and of the council, Dept. of Physics, Univ. of Oslo, 1991–1992.

#### **Censorship and examination**

- Opponent at the PhD dissertation of Kenate Nigussa, NTNU, 2011.
- Opponent at the PhD dissertation of Andrea Baldi, Free University of Amsterdam, 2010.
- Opponent at the PhD dissertation of Suhail Lubbad, University of Bergen, 2009.
- Opponent at the PhD dissertation of Moyses Araujo, Uppsala University, 2008.
- External examiner at the master dissertation of Kjetil Nielsen, NTNU, 2008.
- External examiner at the master dissertation of Kristi Mo, NTNU, 2005.
- External examiner at the master dissertation of Halvor Dalaker, NTNU, 2005.
- Member of the judging committee at the PhD dissertation of Jon Eriksen, Univ. of Oslo, 2003.

#### **Organization of conference and seminars**

- Biannual Meeting of The Condensed Matter Physics with Atomic Physics Division of the Norwegian Physical Society, Lillehammer, June 2009.
- Biannual Meeting of The Condensed Matter Physics with Atomic Physics Division of the Norwegian Physical Society, Bergen, June 2007.
- Seminar series on Density functional theory, Univ. of Oslo, 2000–2001.
- Seminar Series in Energy Physics, Univ. of Oslo, 1999–2000.

#### **Supervision of PhD students**

- Fabian L. M. Bernal, 2013–. Title: *A new class of complex solids: orbitally active transition metal fluorides*
- Xin Song, 2012–. Title: *Nanostructured materials for thermoelectricity*.
- Per Harald Ninive, 2009–. Title: *Precipitates in aluminium studied by means of density functional theory*.
- Thorleif A. Tollefsen, 2010–2013. Title: *High temperature Power Electronic Packaging*.
- Ingvild Julie Thue Jensen, 2007–2013. Title: *Surface studies of hydrogen storage materials*.
- Kianoosh Hadidi, 2008–2012. Title: *Band-structure density functional calculation on surfaces and electrodes of proton conducting oxides*.
- Simone Casolo, 2007–2009. In collaboration with University of Milano (Dr. Rocco Martinazzo). Title: *Hydrogen interacting with advanced carbon materials*.

- Espen Flage-Larsen, 2006–2009. Title: *Density functional studies of the electronic structure and transport properties of thermoelectric materials*.

### Refereeing and evaluation

- Referee for around 20 scientific journals, including Nature Materials, Phys. Rev. Lett., Appl. Phys. Lett., and Nanotechnology.
- Evaluator for various research applications in USA, Sweden and the Netherlands.
- Member of several appointment committees for scientific positions in Norway, Denmark, and USA.

### Publications and presentations

- Reprints of recent journal papers are available as pdf files on <http://folk.uio.no/olem/papers/>.
- Around **70** original scientific papers in refereed international journals. The papers have received more than **1100** citations, the h-index is **19** (ISI Web of Knowledge, Aug. 2013).
- Contributions to **>90** presentations at international conferences; **16** of these were invited talks.
- More than **130** scientific and popular presentations.
- More than **50** interviews and performances in TV, radio, newspapers, etc.

### Publications since 2008 in international journals with referee

68. T. A. Tollefsen, O. M. Løvvik, K. Aasmundtveit, A. Larsson, *Effect of temperature on the die shear strength of a Au-Sn SLID bond*, Metall. Mater. Trans. B (In press).
67. T. A. Tollefsen, A. Larsson, O. M. Løvvik, K. Aasmundtveit, *High temperature interconnect and die attach technology – Au-Sn SLID bonding*, IEEE Trans. Comp. Pack. Manuf. Techn. **3** (2013) 904-914.
66. N. Jalarvo, S. Casolo, N. Aliouane, D. Wallacher, O. M. Løvvik, T. Norby, *On the Complex Structural Picture of the Ionic Conductor  $Sr_6Ta_2O_{11}$* , J. Phys. Chem. C **117** (2013) 9543–9549.
65. A. Marashdeh, J.-W. I. Versluis, Á. Valdés, R. A. Olsen, O. M. Løvvik, G.-J. Kroes, *The effect of transition metal dopants on initial mass transport in the dehydrogenation of NaAlH<sub>4</sub>: a density functional theory study*, J. Phys. Chem. C. **117** (2013) 3–14.
64. D. M. Kepaptsoglou, K. Hadidi, O. M. Løvvik, A. Magraso, T. Norby, A.E. Gunnæs, A. Olsen, Q. M. Ramasse, *Interfacial charge transfer and chemical bonding in a Ni-LaNbO<sub>4</sub> cermet for proton-conducting solid oxide fuel cell anodes*, Chem. Mater. **24** (2012) 4152–4159.
63. S. Casolo, O. M. Løvvik, H. Fjeld, T. Norby, *Theoretical analysis of oxygen vacancies in layered sodium cobaltate  $Na_xCoO_{2-\delta}$* , J. Phys.: Condens. Matter **24** (2012) 475505.
62. I.J.T. Jensen, O.M. Løvvik, H. Schreuders, B. Dam, S. Diplas, *Combined XPS and first principle study of metastable Mg-Ti thin films*, Surf. Interf. Anal. **44** (2012) 986-988.
61. K. Hadidi, T. E. Norby, O. M. Løvvik, A. E. Gunnæs, *Hydrogen energetics and charge transfer in the Ni/LaNbO<sub>4</sub> interface from DFT calculations*, Int. J. Hydrogen Energy **37** (2012) 8033-8042.
60. E. Flage-Larsen, O. M. Løvvik, *Band structure guidelines for higher figure-of-merit; analytic band generation and energy filtering*, in Thermoelectrics and its Energy Harvesting, Edited by D. M. Rowe, CRC Press Inc., ISBN 9781439840412 (2012).
59. K. Hadidi, R. Hancke, T. E. Norby, A. E. Gunnæs, O. M. Løvvik, *Atomistic Study of LaNbO<sub>4</sub>; Surface Properties and Hydrogen Adsorption*, Int. J. Hydrogen Energy **37** (2012) 6674-6685.
58. T. A. Tollefsen, A. Larsson, O. M. Løvvik, K. Aasmundtveit, *Au-Sn SLID bonding – Properties and Possibilities*, Metallurg. Mater. Trans. B. **43** (2012) 397-405.
57. I.J.T. Jensen, S. Diplas, O. M. Løvvik, *Hydrogen induced stabilization of meta-stable Mg-Ti*, Appl. Phys. Lett. **100** (2012) 111902.
56. J. E. Fonnep, O. M. Løvvik, M. H. Sørby, H. W. Brinks, B. C. Hauback, *Adjustment of the decomposition path for Na<sub>2</sub>LiAlH<sub>6</sub> by TiF<sub>3</sub> addition*, Int. J. Hydrogen Energy **36** (2011) 12279-12285.
55. P. Rauwel, O. M. Løvvik, E. Rauwel, E. S. Toberer, G. J. Snyder, J. Taftø, *Nanostructuring in  $\beta$ -Zn<sub>4</sub>Sb<sub>3</sub> with variable starting Zn compositions*, Phys. Stat. Solid. A **7** (2011) 1652–1657 (Featured on the front page of the issue and chosen among the “best of pss 2011”).
54. R. Sæterli, E. Flage-Larsen, J. Friis, O. M. Løvvik, J. Pacaud, K. Marthinsen, R. Holmestad, *Experimental and theoretical study of electron density and structure factors in CoSb<sub>3</sub>*, Ultramicroscopy **111** (2011) 847–853.
53. M.F. Sunding, K. Hadidi, S. Diplas, O.M. Løvvik, T.E. Norby, A.E. Gunnæs, *XPS characterisation of in situ treated lanthanum compounds using tailored charge referencing and peak deconvolution procedures*, J. Electr. Spectrosc. Rel. Phenom. **184** (2011) 399– 409.
52. P. Rauwel, O. M. Løvvik, E. Rauwel, J. Taftø, *Nanovoids in Thermoelectric  $\beta$ -Zn<sub>4</sub>Sb<sub>3</sub>: A Possibility for Nano-Engineering via Zn Diffusion*, Acta Mater. **59** (2011) 5266–5275.

51. H. Grove, O. M. Løvvik, R. H. Heyn, S. M. Opalka, B. C. Hauback, *Decomposition of lithium magnesium aluminum hydride*, Int. J. Hydrogen Energy **36** (2011) 7602–7611.
50. O. M. Løvvik, P. Rauwel, Ø. Prytz, *Self-Diffusion in  $Zn_4Sb_3$  from First-Principles Molecular Dynamics*, Comp. Mater. Sci. **50** (2011) 2663–2665.
49. S. M. Opalka, O. M. Løvvik, S. C. Emerson, Y. She, T. H. Vanderspurt, *Electronic Origins for Sulfur Interactions with Palladium Alloys for Hydrogen-Selective Membranes*, J. Membr. Sci. **375** (2011) 96–103.
48. M. H. Sørby, O. M. Løvvik, M. Tsubota, T. Ichikawa, Y. Kojima, B. C. Hauback, *Crystal structure and dynamics of  $Mg(ND_3)_6Cl_2$* , Phys. Chem. Chem. Phys. **13** (2011) 7644–7648 (**Invited paper**).
47. I.J.T. Jensen, S. Diplas, O.M. Løvvik, *Density functional calculations of Ti nano-clusters in the metastable Mg-Ti system*, Phys. Rev. B **82** (2010) 174121.
46. O. M. Løvvik, O. Swang, E. Unneberg, J. Moxnes, T. L. Jensen, *Surface stability of potassium nitrate  $KNO_3$  from density functional theory*, Comp. Mater. Sci. **50** (2010) 356–362.
45. I.J.T. Jensen, S. Diplas, O.M. Løvvik, J. Watts, S. Hinder, H. Schreuders, B. Dam, *X-ray photoelectron spectroscopy study of  $MgH_2$  thin films grown by reactive sputtering*, Surf. Interf. Anal. **42** (2010) 1140–1143.
44. S. Diplas, O. M. Løvvik, H. Nordmark, D.M. Kepaptsoglou, J. Moe Graff, C. Ladam, F. Tyholdt, J.C. Walmsley, A.E. Gunnæs, R. Fagerberg, A. Ulyashin, *Characterisation of thin and ultra-thin transparent conducting oxide (TCO) films and TCO-Si interfaces with XPS, TEM and ab-initio modelling*, Surf. Interf. Anal. **42** (2010) 874–877.
43. S. Casolo, E. Flage-Larsen, O. M. Løvvik, G. R. Darling, G. F. Tantardini, *The role of the self-interaction error in studying first principles chemisorption on graphene*, Phys. Rev. B **81** (2010) 205412 (5pp).
42. E. Flage-Larsen, O. M. Løvvik, Ø. Prytz, J. Taftø, *Bond analysis of phosphorus skutterudites: Elongated lanthanum electron buildup in  $LaFe_4P_{12}$* , Comp. Mater. Sci. **47** (2010) 752–757.
41. T. A. T. Seip, R. A. Olsen, O. M. Løvvik, *Slab and cluster calculations of the complex hydride  $Mg(NH_2)_2$* , J. Phys. Chem. C **113** (2009) 21648–21656.
40. S. Diplas, O. M. Løvvik, *Electronic structure studies of Ni-X (X: B, S, P) alloys using x-ray photoelectron spectroscopy, x-ray induced Auger electron spectroscopy and density functional theory calculations*, J. Phys.: Condens. Matter **21** (2009) 245503 (9pp).
39. O. M. Løvvik, *Viable storage of hydrogen in materials with off-board recharging using high-temperature electrolysis*, Int. J. Hydrogen Energy **34** (2009) 2679–2683.
38. S. Casolo, O. M. Løvvik, R. Martinazzo, G. F. Tantardini, *Understanding adsorption of hydrogen atoms on graphene*, J. Chem. Phys. **130** (2009) 054704. (Appears also in Virtual J. Nanoscale Sci. Techn. **19** (7) (Febr. 2009).)
37. C. Qiu, S. M. Opalka, O. M. Løvvik, G. B. Olson, *Thermodynamic Modeling of Ti-hydride and Ti Dissolution in Sodium Alanates*, Calphad **32** (2008) 624–636.
36. A. Marashdeh, R. A. Olsen, O. M. Løvvik, G.-J. Kroes, *A density functional theory study of the  $TiH_2$  interaction with a  $NaAlH_4$  cluster*, J. Phys. Chem. C **112** (2008) 15759–15764.
35. O. M. Løvvik, S. M. Opalka, *Reversed surface segregation in palladium-silver alloys due to hydrogen adsorption*, Surf. Sci. **602** (2008) 2840–2844.
34. Ø. Prytz, R. Sæterli, O. M. Løvvik and J. Taftø, *Comparison of the electronic structure of a thermoelectric skutterudite before and after adding rattlers: an electron energy loss study*, Micron, **39** (2008) 685–689. (**Invited paper**).
33. H. Grove, H. W. Brinks, O. M. Løvvik, R. H. Heyn, B. C. Hauback, *The crystal structure of  $LiMgAlD_6$  from combined neutron and synchrotron X-ray powder diffraction*, J. Alloys Comp. **460** (2008) 64–68.
32. S. Sartori, S. M. Opalka, O. M. Løvvik, M. N. Guzik, X. Tang, B. C. Hauback, *Experimental studies of  $\alpha$ - $AlD_3$  and  $\alpha'$ - $AlD_3$  versus first-principles modelling of the alane isomorphs*, J. Mater. Chem., **18**, (2008) 2361–2370 (**Invited paper**).
31. K. Mangersnes, O. M. Løvvik, Ø. Prytz, *Optimization of P-based skutterudites for thermoelectricity from first principles calculations*, New J. Phys. **10** (2008) 053004 (1pp).
30. C. P. Broedersz, R. Gremaud, B. Dam, R. Griessen, O. M. Løvvik, *The highly destabilized Mg-Ti-Ni-H system investigated by DFT and hydrogenography*, Phys. Rev. B **77** (2008) 024204.