

Årsrapport GEMINIsenter FORENT - 2014

Innrapporteringsfrist – slutten av februar hvert år

1. Ledelse og styre

- Navn på ledelse og styremedlemmer i GEMINIsenteret
Styremedlemmer: Torstein Haarberg (til 7. april)/Jack Ødegård (fra 8. april) (SINTEF) og Svein Stølen (UiO) Ledelse: Rune Bredesen (SINTEF) og Truls Norby (UiO)
Koordinering: Henrik Ræder (SINTEF) og Anna Evans (UiO)

2. Medarbeidere

- Ansatte på SINTEF som er aktivt deltagende i GEMINIsenteret
Jonathan Polfus, Thijs Peters, Mehdi Pishahang, Per Martin Rørvik, Marie-Laure Fontaine, Christian Simon, Runar Dahl-Hansen, Marit Stange, Christelle Denonville, Runar Dahl-Hansen, Zuoan Li, Tor Olav Sunde, Wen Xing, Ole Martin Løvvik, Spyros Diplas, Yngve Larring, Henrik Ræder, Parto Henriksen og Rune Bredesen.
- Ansatte på UiO som er aktivt deltagende i GEMINIsenteret
Truls Norby, Reidar Haugsrud, Xuemei Cui, Oddvar Dyrлие
- Masterstudenter med forankring i GEMINIsenteret
Emil Sebastian Gutterød, Adrian Lervik, Rafael Modestino, Irina Zyuzina, Jevgenijs Semjonovs, Olav Thorsen, Kaiqi Xu
- Doktorstudenter, PostDocs med forankring i GEMINIsenteret
Tor S. Bjørheim, Min Chen, Temesgen Debelo Desissa, Anna Evans, Ragnhild Hancke, Ida Hasle, Selene Hernandez Morejudo, Yang Hu, Liv-Elisif Kalland, Zuoan Li, Xin Liu, Andreas Løken, Anna Magrasó Sola, Nahum Maso Carcases, Marit Norderhaug, Shay Robinson, Sarmad W. Saeed, Matthias Schrade, Elena Stefan, Ragnar Strandbakke, Sindre Ø. Stub, Camilla K. Vigen, Einar Vøllestad
- Andre (gjestforskere,...)
Utvexlingsstudenter: Yong Cao, Stephan Prünfte, Sebastian Wachowski, Kun Zheng
Internships og sommerstipendiater: Bogdan Osyka, Vidar Skogvoll, Karina B. Sutija

3. Arrangementer / fellesaktiviteter

- Ledermøte, styremøte (Antall): 0
- Strategisamling (Antall/lengde, tidspunkt, tema, etc): 0
- Workshop, symposium (Antall, tema, intern/ekstern deltagelse): 4
27.01.2014 "Thin films for energy applications" (med ekstern deltagelse)
06.02.2014 "Tutorial Seminar on fuel cells and related topics"
05.06.2014 "Inorganic materials for sustainable society" (med ekstern deltagelse)
23.10.2014 "High-temperature solid-state electrochemistry"
- Faste foredrag/kollokvieserier (omtrentlig antall): 0

4. Felles prosjekter i rapporteringsåret

- Forskningsrådet (KMB, BIP, forskerprosjekt...), varighet og ca budsjett/år

BIGCCS International CCS Research Centre Task 1.2 HT membranes	RCN - FME	18.02.2009 - 31.12.2017	2.7 MNOK/år
BioPCFC Biogas operated proton ceramic fuel cells	RCN - Nano2021	03.09.2012 - 30.09.2015	3.7 MNOK/år
DualCO2 Dual phase membranes for CO ₂ separation in power generation	RCN - CLIMIT	01.05.2011 - 31.11.2015	2.5 MNOK/år
FOXCET Functional oxides for clean energy technologies: fuel cells, gas separation membranes and electrolyzers	RCN - Nano2021	02.10.2014- 31.12.2017	11.6MNOK/år
METALLICA Metal supported proton conducting electrolyser cell for renewable hydrogen production	RCN - EnergiX	01.07.2013- 30.06.2016	4.3 MNOK/år
NaProCs Nanoceramics – a new class of proton conductors for hydrogen fuel cells and electrolyzers	RCN - RENERGI	01.06.2012 - 30.09.2015	1.7 MNOK/år
PlusUltra Novel photoelectrocatalytic concepts for conversion of water, carbon dioxide, and nitrogen to fuels and chemicals	RCN - EnergiX	01.04.2014- 31.03.2017	3.7 MNOK/år
ROMA Robust ceramic membranes for production of hydrogen and aromatic compounds originated from biogas	RCN - Nano2021	01.06.2013 - 30.08.2016	2.0 MNOK/år
SEALEM Self-healing ceramic membranes with increased lifetime for CO ₂ capture in industrial processes and power production	RCN - CLIMIT	01.06.2013 - 31.12.2016	2.9 MNOK/år
THELMA Nanostructuring for improving the energy efficiency of thermoelectric generators and heat-pumps	RCN - Nano2021	01.10.2013- 21.12.2017	13.2 MNOK/år

- EU/andre internasjonale utlysninger, varighet og ca budsjett/år

ELECTRA High temperature electrolyser with novel proton ceramic tubular modules of superior efficiency, robustness, and lifetime economy	EU - FCH – JU	03.03.2014- 02.03.2017	11.0 MNOK/år
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- Industriprosjekt (nasjonalt/internasjonalt), varighet og ca budsjett/år
- Andre (offentlig,...), varighet og ca budsjett/år

5. Felles nye søknader og initiativer i rapporteringsåret

- Prosjektsøknader og –tilbud utarbeidet i løpet av året.

Ph2BioCat Solar-based H ₂ generation in novel photoelectrochemical cells using engineered hydrogenases as biocatalysts, 01.01.2015-31.12.2017, 4.2 MNOK/år	RCN - Nano2021 <i>accepted</i>
Hyperlon Novel materials and reactor concept to oxygenate steam for autothermal gasification and reforming	RCN - CLIMIT nye konsepter, forskerprosjekt <i>rejected</i>
ElAmmonia Efficient production of ammonia and valuable chemicals by electrocatalytic membranes	RCN - Nano2021 forskerprosjekt <i>rejected</i>
CombOxy Oxygen Membrane Combustor for CO ₂ Capture in Power Generation	RCN - CLIMIT KPN <i>rejected</i>
DESIMAL Designing of materials with right surface tension for holding functional liquids in order to obtain new and/or improved membranes	RCN forskerprosjekt <i>rejected</i>

- Annet

6. Resultater

- Doktorstudenter, med forankring i Geminisenteret, som har disputert: 4
Matthias Schrade, Ragnar Strandbakke, Camilla Vigen, Einar Vøllestad
- Antall uteksaminerte Master studenter, med forankring i Geminisenteret: 0
- Antall prosjektoppgaver med forankring i Geminisenteret: 4
- (Felles)¹ Tidsskriftpublikasjon (nivå 1 el 2) innen Geminisenterets område:

Felles UiO-SINTEF:

A. Magraso, M.-L. Fontaine, R. Bredesen, R. Haugrud, T. Norby, "Cathode compatibility, operation, and stability of LaNbO₄-based proton conducting fuel cells", *Solid State Ionics* 262 (2014) 382-387

A. Magraso, M.-L. Fontaine, R. Haugrud, T. Norby, "Hydrogen oxidation kinetics and performance of Ni-LaNbO₄ cermet anodes for proton conducting SOFCs", *Journal of the Electrochemical Society* 161 (2014) F373-F379

M. Schrade, S. Casolo, P.J. Graham, C. Ulrich, S. Li, O.M. Løvvik, T. Finstad, T. Norby, "Oxygen nonstoichiometry in (Ca₂CoO₃)_{0.62}(CoO₂): a combined experimental and computational study", *The Journal of Physical Chemistry C* 118 (2014) 18899-18907

¹ Se kommentar til tabellen under kapittel 8.

UiO alene:

- T.S. Bjørheim, R. Haugrud, T. Norby, "Protons in acceptor doped langasite, $\text{La}_3\text{Ga}_5\text{SiO}_{14}$ ", *Solid State Ionics* 264 (2014) 76-84.
- T.S. Bjørheim, E. Kotomin, "Ab initio thermodynamics of oxygen vacancies and zinc interstitials in ZnO ", *Journal of Physical Chemistry Letters* 5 (2014) 4238-4242
- N. Cebasek, R. Haugrud, T. Norby, "Cation transport in Sr and Cu substituted $\text{La}_2\text{NiO}_{4+\delta}$ studied by inter-diffusion", *Solid State Ionics* 254 (2014) 32-39.
- K.O. Iwu, A. Galeckas, S. Diplas, F. Seland, A. Kuznetsov, T. Norby, "Effects of temperature, triazole and hot-pressing on the performance of TiO_2 photoanode in a solid-state photoelectrochemical cell", *Electrochimica Acta* 115 (2014) 66-74
- A. Løken, C. Kjølseth, R. Haugrud, "Electrical conductivity and TG-DSC study of hydration of Sc-doped CaSnO_3 and CaZrO_3 ", *Solid State Ionics* 267 (2014) 61-67
- A. Magraso, R. Haugrud, "Effects of the La/W ratio and doping on the structure, defect structure, stability and functional properties of proton-conducting lanthanum tungstate $\text{La}_{28-x}\text{W}_{4+x}\text{O}_{54+\delta}$. A review", *Journal of Materials Chemistry A* 2 (2014) 12630-12641
- S.R.H. Rahman, I. Ahmed, R. Haugrud, S.G. Eriksson, C. Knee, "Characterisation of structure and conductivity of $\text{BaTi}_{0.5}\text{Sc}_{0.5}\text{O}_{3-\delta}$ ", *Solid State Ionics* 255 (2014) 140-146
- M. Schrade, H. Fjeld, T. Finstad, T. Norby, "Electronic Transport Properties of $[\text{Ca}_2\text{CoO}_{3-\delta}]_q[\text{CoO}_2]$ ", *The Journal of Physical Chemistry C* 118 (2014) 2908-2918
- M. Schrade, H. Fjeld, T. Norby, T. Finstad, "Versatile apparatus for thermoelectric characterization of oxides at high temperatures", *Review of Scientific Instruments* 85 (2014)
- M. Schrade, R. Kabir, S. Li, T. Norby, T. Finstad, "High temperature transport properties of thermoelectric CaMnO_{3-d} - Indication of strongly interacting small polarons", *Journal of Applied Physics* 115 (2014)
- J.E. Stehr, K.M. Johansen, T.S. Bjørheim, L. Vines, B.G. Svensson, W.M. Chen, I.A. Buyanova, "Zinc-Vacancy–Donor Complex: A Crucial Compensating Acceptor in ZnO ", *Physical Review Applied* 2 (2014) 021001
- C.K. Vigen, R. Haugrud, "Hydrogen flux in $\text{La}_{0.87}\text{Sr}_{0.13}\text{CrO}_{3-\delta}$ ", *Journal of Membrane Science* 468 (2014) 317-323
- E. Vøllestad, C.K. Vigen, A. Magraso, R. Haugrud, "Hydrogen permeation characteristics of $\text{La}_{27}\text{Mo}_{1.5}\text{W}_{3.5}\text{O}_{55.5}$ ", *Journal of Membrane Science* 461 (2014) 81-88
- W. Xing, P. Rauwel, C.H. Hervoches, Z. Li, R. Haugrud, "Structure and transport properties in un-doped and acceptor-doped gadolinium tungstates", *Solid State Ionics* 261 (2014) 87-94

SINTEF alene:

- Pishahang Mehdi, Larring Yngve, McCann Michael, Bredesen Rune (2014). $\text{Ca}_{0.9}\text{Mn}_{0.5}\text{Ti}_{0.5}\text{O}_{3-\delta}$: A suitable oxygen carrier material for fixed-bed chemical looping combustion under syngas conditions. *Industrial & Engineering Chemistry Research* 53, 26, 10549-10556.
- Rørvik Per Martin, Haavik Camilla, Griesche David, Schneller Theodor, Lenrick Filip, Wallenberg L. Reine (2014). Chemical solution deposition of thin films for protonic ceramic fuel cells. *Solid State Ionics* 262, 852-855.

- (Felles)¹ Konferansebidrag innen Geminisenterets område

Felles UiO-SINTEF:

R. Bredesen, M.-L. Fontaine, T. Peters, W. Xing, T. Norby, A. Evans, "CO₂ flux and separation properties of high temperature dual phase membranes", ICIM13, Brisbane, 2014-09-06 - 2014-09-09

A. Evans, W. Xing, M.-L. Fontaine, T. Peters, R. Bredesen, T. Norby, "A new approach for obtaining transport numbers of native and foreign ions in molten carbonates", Det 20. Landsmøte i Kjemi, Lillestrøm, 2014-10-29 - 2014-10-30

A. Evans, W. Xing, M.-L. Fontaine, T. Peters, R. Bredesen, T. Norby, "Ambipolar transport in molten carbonates for dual-phase CO₂ separation membranes", ICIM13, Brisbane, 2014-07-06 - 2014-07-10

A. Evans, W. Xing, M.-L. Fontaine, T. Peters, R. Bredesen, T. Norby, "Dual-phase membranes for CO₂ separation: CO₂ flux, transport numbers and conductivity of molten carbonates", I2E Seminar at Chimie ParisTech, Paris, 2014-05-26

A. Evans, W. Xing, M.-L. Fontaine, T. Peters, R. Bredesen, T. Norby, "Effect of steam on fluxes in dual-phase CO₂ separation membranes", CLIMIT PhD seminar, Lysaker, 2014-10-21 - 2014-10-22

A. Evans, W. Xing, M.-L. Fontaine, T. Peters, R. Bredesen, T. Norby, "Mixed ion transport in dual-phase membranes for CO₂ separation", 7th KIFEE International Symposium on Environment, Energy and Materials, Kyoto, 2014-03-16 - 2014-03-19

A. Evans, W. Xing, T. Norby, "Transport numbers for native and foreign ions in molten carbonates: results from UiO", DualCO₂ project meeting at Chimie ParisTech, Paris, 2014-05-14

M.-L. Fontaine, A. Magrasó, J.M. Polfus, T. Norby, P.I. Dahl, M. Pishahang, R. Bredesen, "Effects of sintering additives on BaZr_{1-x}Y_xO_{3-d} densification, stability, and proton conductivity", ICIM 13, Brisbane, 2014-09-06 - 2014-09-09

M.-L. Fontaine, T. Norby, W. Xing, Z. Li, P.P. Henriksen, R. Bredesen, "Self-heating of ion conducting membranes", ICIM13, Brisbane, 2014-09-06 - 2014-09-09

O.M. Løvvik, X. Song, K. Valset, E. Flage-Larsen, H. Fjeld, J.S. Graff, M. Schrade, O.B. Karlsen, A. Larsson, S. Casolo, Ø. Prytz, T. Norby, T. Finstad, A.E. Gunnæs, J. Taftø, "Thermoelectric materials from first principles to final applications: Basic and applied thermoelectrics in Oslo", Invited talk at the DLR Thermoelectric Colloquium, Köln, 2014-05-08

N. Maso Carcases, J. Polfus, M.-L. Fontaine, T. Norby, "Electrical properties of nonstoichiometric Ba_{1+x}Zr_{0.85}Y_{0.15}O_{2.925} ceramics prepared by solid state reactive sintering", 4th National meeting on Inorganic and Materials Chemistry, Lillestrøm, 2014-10-29 - 2014-10-30

N. Maso Carcases, J. Polfus, M.-L. Fontaine, T. Norby, "Electrical properties of undoped and acceptor-Doped (LaO)₂SO₄ Ceramics", 4th National meeting on Inorganic and Materials Chemistry, Lillestrøm, 2014-10-29 - 2014-10-30

T. Norby, R. Hancke, M.-L. Fontaine, "Internally heated gas separation membranes", Gemini meeting, Oslo, 2014-10-23

T. Norby, R. Strandbakke, A. Evans, Xing, Wen, "Characterisation of transport in oxides with more than one ionic charge carrier", Department guest lecture, Ekaterinburg, 2014-05-22

J.M. Polfus, M.-L. Fontaine, N. Maso Carcases, A. Magraso, M. Pishahang, T. Norby, R. Bredesen, "Sintering Mechanisms and H₂S stability of BaZrO₃ ceramics with sintering aids for biogas operated fuel cells", Solid State Protonic Conductors (SSPC-17), Seoul, 2014-09-14 - 2014-09-19

S.W. Saeed, "A novel two phase composite for hydrogen separation", Climit PhD seminar, Lysaker, 2014-10-21 - 2014-10-22

X. Song, C. Persson, T. Norby, E. Flage-Larsen, O.B. Karlsen, V. Hansen, A.E. Gunnæs, Ø. Prytz, O.M. Løvvik, T. Finstad, K. Valset, X. Cui, J. Taftø, H. Fjeld, B. Hauback, M. Schrade, "Conversion of Heat and Energy: Thermoelectrics", NorTex Nano Summit, Huston TX, 2014-10-11 - 2014-10-14

E. Stefan, M. Stange, C. Denonville, R. Dahl-Hansen, Y. Larring, P.M. Rørvik, M.-L. Fontaine, R. Haugrud, T. Norby, "Metal Supported Proton Ceramic Electrolyser Cells (PCEC) for Renewable Hydrogen Production", National meeting on Inorganic and Materials Chemistry, Lillestrøm, 2014-10-29 - 2014-10-30

S.Ø. Stub, P.M. Rørvik, R. Haugrud, T. Norby, "Modelling of surface conduction of porous oxides", Solid state protonic conductors – SSPC17, Seoul, 2014-09-14 - 2014-09-19

UiO alene:

T.S. Bjørheim, "Defect segregation at oxide-water contacts from ab initio calculations". Maier-department workshop, Max-Planck Institute for Solid State Research, Stuttgart, 2014-05-12 - 2014-05-14

T.S. Bjørheim, "Defects in oxides from ab initio calculations". Department seminar, Max-Planck Institute for Solid State Research, Stuttgart, 2014-02-19 - 2014-02-19

T.S. Bjørheim, R. Haugrud, C. Knee, S.R.H. Rahman, "Hydration thermodynamics of the oxygen deficient perovskite series BaTi_{1-x}M_xO_{3-d} (M=In, Sc)", Solid State Protonic Conductors 17, Seoul, 2014-09-14 - 2014-09-19

T.S. Bjørheim, E. Kotomin, R. Haugrud, J. Maier, "Defect thermodynamics of BaZrO₃ from first principles phonon calculations", Solid State Protonic Conductors 17, Seoul, 2014-09-14 - 2014-09-19

T.S. Bjørheim, K. Toyoura, T. Norby, R. Haugrud, "Proton transport in the langasite family of oxides". Solid State Protonic Conductors 17, Seoul, 2014-09-14 - 2014-09-19

T.S. Bjørheim, E. Kotomin, R. Haugrud, J. Maier, "Defect thermodynamics of BaZrO₃ from first principles phonon calculations", FM&NT, Riga, 2014-09-29 - 2014-10-03

T.S. Bjørheim, "Defect properties of functional oxides from first principles". NKS årsmøte; fagruppe kvantekjemi, Lillestrøm 2014-10-29 - 2014-10-30

K.M. Johansen, L. Vines, T.S. Bjørheim, R. Schifano, B.G. Svensson, "ZnO as a transparent conductive oxide (TCO) material for solar cells". Norwegian Solar Cell Conference, Son, 2014-05-12 - 2014-05-13

- K.M. Johansen, L. Vines, T.S. Bjørheim, R. Schifano, B.G. Svensson, "Aluminium Diffusion in Single Crystalline Zinc Oxide", IWZnO 2014, Niagara Falls, 2014-09-07 - 2014-09-11
- R. Hancke, Z. Li, Zuoan, R. Haugsrud, "Correlation between bulk and surface kinetics of YBC and LWO", SSPC 17, Seoul, 2014-09-14 - 2014-09-19
- Y. Hu, T. Norby, O. Nilsen, H. Fjellvåg, "Challenges in the electrical characterization of thin films", Gemini FORENT thin films seminar, Oslo, 2014-01-27 - 2014-01-27
- Y. Hu, A. Ruud, V. Miikkulainen, T. Norby, O. Nilsen, H. Fjellvåg, "Electrical characterization of LiAlO₂ thin films prepared by Atomic Layer Deposition (ALD)", E-MRS 2014 spring meeting, Lille, 2014-05-25 - 2014-05-30
- Y. Hu, A. Ruud, V. Miikkulainen, T. Norby, O. Nilsen, H. Fjellvåg, "Investigation of the electrical conductivity on LiAlO₂ thin films deposited by Atomic Layer Deposition", 4th National Meeting on Inorganic and Materials Chemistry, Lillestrøm, 2014-10-29 - 2014-10-30
- Y. Hu, S.W. Saeed, L.-E.Q. Kalland, N. Sharova, I. Lorentzen, T. Norby, "Characterisation of Electrical Properties of Oxide Materials" 7th KIFEE International Symposium on Environment, Energy and Materials, Kyoto, 2014-03-16 - 2014-03-19
- L.-E.Q. Kalland, R. Haugsrud, C. Knee, T. Norby, "Protons in rare earth fluorites", The 17th International Conference on Solid State Protonic Conductors; Seoul, 2014-09-14 - 2014-09-19
- Z. Li, C.K. Vigen, S.W. Saeed, A. Evans, R. Hancke, E. Vøllestad, R. Haugsrud, T. Norby, "Research on Dense Ceramic Gas Separation Membranes at UiO", 7th KIFEE International Symposium on Environment, Energy and Materials, Kyoto, 2014-03-16 - 2014-03-19
- A. Løken, T.S. Bjørheim, R. Haugsrud, "Hydration thermodynamics of BaCe_{0.9}M_{0.1}O_{3-δ} (M = Sc, Ga, Y, In, Gd and Er): Elucidating effects of dopant choice. Solid State Protonic Conductors, SSPC 17, Seoul, 2014-09-14
- A. Løken, T.S. Bjørheim, R. Haugsrud, "Proton Mobility in BaCe_{0.9}M_{0.1}O_{3-δ} (M = In, Sc, Y and Gd): Addressing the effects of dopant trapping", Solid State Protonic Conductors, SSPC 17, Seoul, 2014-09-14
- N. Maso Carcases, O. Thorsen, P. Engeset, T. Norby, "Proton Ceramic Fuel Cells", 7th KIFEE International Symposium on Environment, Energy and Materials, Kyoto, 2014-03-16 - 2014-03-19
- T. Norby, "High temperature steam and CO₂ electrolysis with proton conducting ceramics", 7th KIFEE Symposium, Kyoto, 2014-03-16 - 2014-03-19
- T. Norby, "Hydrogen and fuel cell related activities at University of Oslo", IPHE Educational Event in Oslo, H2igher Educational Rounds - H2ER, Oslo, 2014-05-19
- T. Norby, "Proton conducting materials for electrochemical energy conversion at high temperatures", 19th Meeting of the Portuguese Electrochemical Society, Aveiro, 2014-06-30 - 2014-07-02
- T. Norby, "Proton conductors from ambient to high temperatures - principles and characterisation", Instituttseminar; Lyngby, 2014-08-07
- T. Norby, "Protons and exotic hydrogen species in oxides - presence, effects, and applications", I2CNER Seminar Series, Fukuoka, 2014-03-14

- T. Norby, "There's plenty of room inside", Department seminar, Oslo, 2014-03-20
- T. Norby, C. Kjølseth, S. Hernández Morejudo N. Sharova, R. Jalarvo, "Studies of dehydrogenation reactions using ceramic tubular catalytic membrane reactors", ICIM13, Brisbane, 2014-07-06 - 2014-07-09
- T. Norby, R. Strandbakke, V. Cherepanov, A. Zuev, Andrey, C. Argirusis, "Model and methodology for investigation of oxygen electrodes on BZCY electrolytes", International Conference on Solid-State Protonic Conductors 17 (SSPC-17), Seoul, 2014-09-14 - 2014-09-19
- T. Norby, S.Ø. Stub, "A master model for proton conducting materials", Det 20. landsmøte i kjemi, Lillestrøm, 2014-10-29 - 2014-10-30
- M. Norderhaug, T. Norby, "A Study of Pt-electrode Interfaces on Nb-Doped TiO₂ by Cyclic Voltammetry and Impedance Spectroscopy", Det 20. landsmøte i kjemi og National Inorganic Meeting (fellesarrangement), Lillestrøm, 2014-10-29 - 2014-10-30
- S.A. Robinson, "Ni-free Anode Development for the Proton Conducting Ceramic BaZr_{0.7}Ce_{0.2}Y_{0.1}O_{3-δ} (BZCY72). The 20th National Chemistry Conference, Lillestrøm, 2014-10-29 - 2014-10-30
- S.A. Robinson, C. Kjølseth, G. Coors, T. Norby, "Development of Cu-based Anodes for BZCY72 Proton Ceramic Membrane Reactors", European Fuel Cell Forum, Lucerne, 2014-07-01 - 2014-07-04
- R. Strandbakke, A. Evans, T. Norby, "Investigation of the ionic transport in ceramic-carbonate composites. NANOMFC kick-off meeting, New Delhi, 2014-10-09 - 2014-10-10
- R. Strandbakke, T. Norby, A. Zuev, V. Cherepanov, C. Argirusis, "Model and methodology for investigation of oxygen electrodes on BZCY* electrolytes", Prosjektmøte, Electra, Joint Technology Initiatives, Collaborative Projects (FCH), GA No. 621244, Verniolle, 2014-09-29 - 2014-09-30
- E. Vøllestad, T. Norby, "Steam to hydrogen using high temperature proton ceramic electrolyser cells (PCEC)", Landsmøte i Norsk Kjemisk Selskap - Faggruppe for Uorganisk Materialkjemi, Lillestrøm, 2014-10-29 - 2014-10-30
- E. Vøllestad, R. Haugrud, "Cation diffusion related degradation in proton conducting oxides", Solid State Protonic Conductors 17, Seoul, 2014-09-14 - 2014-09-19

SINTEF alene:

- Polfus Jonathan M., Xing Wen, Fontaine Marie-Laure, Denonville Christelle, Henriksen Partow Pakdel, Bredesen Rune (2014). Ceramic Composites of Mixed Ionic-Electronic conductors as Hydrogen Membranes. Solid State Protonic Conductors (SSPC-17), sep 14 - sep 19
- Polfus Jonathan M., Xing Wen, Fontaine Marie-Laure, Henriksen Partow Pakdel, Bredesen Rune (2014). Ceramic Composites of Mixed Ionic-Electronic Conductors as Hydrogen Membranes. International Conference on Inorganic Membranes (ICIM-13), jul 06 - jul 09
- Fontaine Marie-Laure, Denonville Christelle, Dahl Paul Inge, Xing Wen, Larring Yngve, Henriksen Partow Pakdel, Bredesen Rune (2014). Scaling up of oxygen transport membranes designed as asymmetric tubular membranes. ICIM13, sep 06 - sep 09

Polfus Jonathan M., Xing Wen, Hanetho Sidsel Meli, Dahl Paul Inge, Riktor Marit Dalseth, Larring Yngve, Fontaine Marie-Laure, Henriksen Partow Pakdel, Bredesen Rune (2014). Enhancing the O₂ permeability of CaTi_{0.85}Fe_{0.15}O_{3-δ} based membranes by Mn-doping. International Conference on Inorganic Membranes (ICIM-13), jul 04 - jul 09

Larring Yngve, Braley Carole, Pishahang Mehdi, Andreassen Kari Anne, Bredesen Rune (2014). Evaluation of Fe-Mn oxide system for CLC. Chemical Looping Conference 2014, sep 09 - sep 11

Stange Marit Synnøve Sæverud, Denonville Christelle, Larring Yngve, Mougin Julie, Brevet Aude, larsson Per-Olof (2014). Coating developments for Metal-supported Solid Oxide Fuel Cells. Foredrag - EFCF, jul 01 - jul 04

Mokkelbost Tommy, Larring Yngve, Schøning Christian, Darell Ove, Fossdal Anita, Spjelkavik Aud I., Pishahang Mehdi, Thoretton Vincent, Wiik Kjell (2014). Oxygen Carrier Production - Fabrication of Oxygen Carrier Materials by Different Industrial Methods for Chemical Looping Combustion. International Conference on Chemical Looping 2014, sep 09 - sep 11

Pishahang Mehdi, Larring Yngve, Mokkelbost Tommy, Fossdal Anita, Andreassen Kari Anne, Darell Ove, Arstad Bjørnar, Blom Richard, Langørgen Øyvind (2014). Hot attrition testing in 3 kW dual circulating fluidized bed reactor. Chemical Looping Conference 2014, sep 09 - sep 11

Fontaine Marie-Laure, Denonville Christelle, Dahl Paul Inge, Xing Wen, Larring Yngve, Henriksen Partow Pakdel, Bredesen Rune (2014). Scaling up of oxygen transport membranes designed as asymmetric tubular membranes. ICIM13, sep 06 - sep 09

Jacobs Marijke, Van Noyen Jasper, Larring Yngve, McCann Michael, Pishahang Mehdi, Amini Shahriar, Ortiz Maria, Gallucci Fausto, van Sint Annaland Martin, Haije Wim, Cobden Paul D., Tournigant Didier, Louradour Eric, Snijkers Frans (2014). Thermal and mechanical behaviour of oxygen carrier materials for chemical looping combustion in a packed bed reactor. Chemical Looping Conference 2014, sep 09 - sep 11

- Populærvitenskapelig profilering innen Geminisenterets område

T. Norby, "Hydrogenbilen", Debattmøte om hydrogen- vs. batterielektriske biler, Trondheim 2014-01-21

T. Norby, "Hydrogen - helt sikkert!", Cutting Edge 2014, Oslo, 2014-10-16

- Innsendte felles patentsøknader
Ingen
- Innvilgede felles forskningsprosjekt med ekstern finansiering, unntatt EU:
PH2BioCat, THELMA
- Innvilgede søknader om EU prosjekt
ELECTRA (JU-FCH)
- Felles investering (utstyr, laboratorier...)
Ingen

7. Annet

8. Tabeller

GEMINIsenterkoordinator har tidligere år talt opp det som har vært rapportert i tekstkapitlene for å lage en oversikt over total aktivitet i GEMINIsentrene. Den har blitt presentert for styringsgruppen, og andre i NTNUs og SINTEF's ledelse. Som en kvalitetssikring ber jeg dere om selv å fylle ut tabellen.

I tabellen ber vi om både det totale antallet av henholdsvis tidsskriftpublikasjoner og konferanseforedrag i Geminisenteret, og hvor mange av disse som er felles, dvs med forfattere fra minst to av partnerne. Dette er fordi vi ønsker å få et bilde både av den totale aktiviteten i senteret, og hvor stor del av denne som er felles.

		Antall
Medarbeidere (ansatt)	SINTEF	19
	UiO	4
Studenter og andre	Mastergrad	7
	PhD/postdoc	23
	Andre	7
Arrangementer	Leder/styremøte	0
	strategisamling	0
	workshop/konferanse...	4
	Foredrag/kollokvieserier	0
Resultater	PhD-disputas	4
	Masteroppgaver	0
	Prosjektoppgaver	4
	Tidsskriftpublikasjoner	19
	Felles tidsskriftpublikasjoner	3
	Konferansebidrag/foredrag	66
	Felles konferansebidrag /foredrag	19
	Populærvitenskapelig profilering	2
	innsendt felles patenter	0
	Felles investering (MNOK)	0

Ad tabellen over: Kategoriene i radene er gjort for å registrere alt arbeid mot felles prosjekter i GEMINIsenteret. "Innvilgede prosjekter" er prosjekter der beskjed om at prosjektet får finansiering kom i rapporteringsåret, uavhengig av når søknad ble skrevet. Et prosjekt telles i alle kategorier dersom både søknad, innvilgning og prosjektstart var i rapporteringsåret. Når det gjelder budsjett/år, så gjør et grovt overslag. For prosjekter som går over flere år så er det ok å ta totalbudsjettet til alle partnerne og dele det på antall år, uavhengig av om kostnadene er jevnt fordelt over årene. Vi ønsker å få frem tall som viser hvor stor verdi fellesprosjektene i GEMINIsenterordningen representerer, og da er disse unøyaktighetene ikke viktige.

Finansieringskilde:	Forskningsrådet		EU/annet internasjonalt		Industri		Andre	
	Antall	ca budsjett/år [MNOK]	Antall	ca budsjett/år [MNOK]	Antall	ca budsjett/år [MNOK]	Antall	ca budsjett/år [MNOK]
Aktiviteter i rapporteringsåret								
Felles prosjekter som er i gang	10	48.3	1	11.0	0	0	0	0
Felles prosjektsøknader	6		1		0		0	
Innvilgede felles prosjektsøknader	2		1		0		0	

Vedlegg A - Revidert strategiplan

Vedlegg B - Revidert handlingsplan for neste år