Aug 31 – Sept 01, 2011

LERCHENDAL GÅRD, NTNU, Trondheim, Norway

Norway—China

Norway-China Workshop on Nanotechnology for (renewable) energy materials

- To build Chinese-Norwegian network
- To foster knowledge of nanotechnology and materials for energy applications
- To promote bilateral research projects

Forskningsrådet

NTNU
Norwegian University of Science and Technology

Norway-China Workshop on nanotechnology for (renewable) energy materials

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Objectives

Significant improvements are expected in the coming years in the production of energy, in particular from renewable and environmentally friendly energy sources. Efficient and reliable energy transport and storage systems, highly efficient solar cells, and ability to harvest more energy from the environments are all among expected breakthroughs in the near future. Further developments of materials with tailormade properties directed to these targets are needed for these advances. Tailormade materials at the nanoscale applying various principles from nanotechnology are expected to have large impact on the renewable energy field. A series of recent developments highlights the potential of these strategies.

China is becoming world's most important research-nation, especially in the field of renewable energy and nanotechnology. Norway is an energy nation and sets high priority in cooperation with China in the field of renewable energy.

With the support of the Norwegian Research Council via the RENERGI program, Norwegian Academy of Technological Science, NTNU Nanolab and NTNU Strategic Areas Materials, we are going to hold the first Norway-China workshop on nanotechnology for (renewable) energy materials, Trondheim, Norway. In this workshop we invite a group of experts in the thematic fields from Tsinghua University, China; National center for Nanoscience and Technology, China; Beijing University of Science and Technology as well as the Norwegian University of Science and Technology (NTNU) and SINTEF to present their latest research. Getting acquainted with each other and seeking long term cooperation between China and Norway form the motivation behind this key event. It aims to build Chinese-Norwegian network, foster knowledge of nanotechnology and materials for energy applications, promote bilateral research projects, and increase international student recruitment.

Zhiliang Zhang
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Beijing University of Science and Technology, China

Centre for Nano and Micro Mechanics, Tsinghua University, China

National Center for Nanoscience and Technology, China

Norwegian Academy of Technological Sciences (NTVA)

Norwegian Research Council, RENEGI program

NTNU Strategic Areas Materials, NTNU, Norway

NTNU Nanolab, NTNU, Norway

NTNU Nanomechanical Lab, NTNU, Norway

Organizing committee

ZHANG, Zhiliang	NTNU Nanomechanical Lab	挪威科技大学	**Chairman**
CHEN, Changqing	Tsinghua University	清华大学	**Coordinator**
GAUTUN, Hanna	NTNU Nanolab	挪威科技大学	**Coordinator**
HE, Jianying	NTNU Nanomechanical Lab	挪威科技大学	**Coordinator**
JOHNSEN, Roy	NTNU Strategic Areas Materials	挪威科技大学	
JOHNSON, Hein	NTVA	挪威技术科学院	
QIAO, Lijie	Beijing University of Science and Technology	北京科技大学	
STOKKE, Bjørn	NTNU Nanolab	挪威科技大学	
THAULOW, Christian	NTNU	挪威科技大学	
ZHENG, Quanshui	Tsinghua University	清华大学	

Key speakers

CHEN, Changqing	*Mechanics of sintered metallic fiber felt*
EINARSRUD, Mari A.	*Proton conducting oxides for solid oxide fuel cells and membrane reactors*
FENG, Xi-Qiao	*Micro-/nanomechanics in the fabrication of biomimetic materials*
GIBSON, Ursula	*ZnO nanowire solar cells*
HÄGG, May B.	*Membranes in Energy Processes*
JELLE, Bjørn P.	*Nanomaterials for Thermal Building Insulation*
LIU, Bin	*FEM based multiscale simulation method*
LUO, Jun	*Nanoscale fuel cells based on nanowires*
SUNDE, Svein	*Bimetallic electrocatalysts for PEM fuel cells*
THAULOW, Christian	*Fracture of Silicon – a bottom up approach*
WEI, Fei	*Structure control and mass production of carbon nanotube arrays*
WEMAN, Helge	*III-V nanowires for high-efficiency solar cells*
XU, Zhiping	*Solving the Energy Crisis: From Nature to Engineering*
YAO, Qiang	*Submicro particle deposition: the role of electric field*
ZHANG, Yue	*ZnO Nanomaterials and Nanodevices for Energy*
ZHANG, Zhong	*Graphene and carbon nanotubes based hierarchical structure nanocomposites*
ZHENG, Quanshui	*Wetting and transporting at nano and micro scale for clean and energy*
ZHU, Hongwei	*Growth mechanism and photovoltaic applications of grapheme*
ZHU, Jing	*Nanowire-Based Biofuel Cells for Self-Powering Nanosyste*

The contact info for each invited speaker is given. You are encouraged to make contacts with the invited speakers beforehand to facilitate the potential cooperation.

Venue

LERCHENDAL GÅRD Strindvegen 2, 7491, Trondheim, Norway.

Registration

Contact: Hanna Gautun

Email: hanna.gautun@nt.ntnu.no

Deadline: 17.06.2011

Fee: Free registration

Maximum number of participants is 70

Preliminary Program

Tuesday, August 30th, place to be announced after registration

19:00	Reception

Wednesday, August 31st , LERCHENDAL GÅRD

08:30	Welcome, **NTNU Rector Prof. Thorbjørn Digernes**
08:40-09:50	2 presentations
09:50-10:10	Refreshment
10:10-11:55	3 presentations
12:00-13:00	Lunch
13:05-14:50	3 presentations
14:50-15:10	Refreshment
15:10-16:20	2 presentations
16:20-17:00	Panel discussion
19:00	Dinner, place to be announced after registration

Thursday, September 1st , LERCHENDAL GÅRD

08:30-10:15	3 presentations
10:15-10:35	Refreshment
10:35-11:45	2 presentations
12:00-13:00	Lunch
13:05-14:50	3 presentations
14:50-15:10	Refreshment
15:10-16:20	2 presentations
16:20-16:50	Panel discussion
16:50-17:00	Concluding remarks

Mechanics and applications of sintered metallic fiber felt

Changqing CHEN

Center for Nano- and Micro- Mechanics (CNMM), Department of Engineering Mechanics, Tsinghua University

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Changqing CHEN, Professor of Solid Mechanics in Center for Nano- and Micro- Mechanics (CNMM), Department of Engineering Mechanics, Tsinghua University. His research interests include numerical modeling of the microstructure evolution of materials, nano- and micro-mechanics of porous materials, atomistic simulation of the mechanical behavior of ferroelectric ceramics, and mechanics of energy materials,. He is the principal investigator (PI) or co-PI of several projects on the aforementioned topics supported by the Natural Science Foundation of China (NSFC), Chinese Ministry of Science and Technology, and the Chinese industry.

Selected publications

1 Li T, Chen CQ, Zhou JX. 2011. Three dimensional phase field study on the thickness effect of ferroelectric polymer thin film. ***Theoretical and Applied Mechanics Letters***, 1, 011008.

2 Duan YF, Qin LX, Tang G, Chen CQ. 2010. Effect of epitaxial strain on the properties of short-period BaTiO3/PbTiO3 superlattice from firs tprinciples calculations. ***Phys. Lett. A.***, 475, 2075-2078.

3 Duan YF, Tang G, Wang CM, Chen CQ. 2010. Influence of uniaxial tensile stress on the mechanical and piezoelectric properties of short-period ferroelectric superlattice. ***Nanoscale Res. Lett***. 5, 448–452.

4 Xin FX, Lu TJ, Chen CQ. 2010. Sound Transmission through Simply Supported Finite Double-Panel Partitions with Enclosed Air Cavity. ***ASME J. Vib. Acoust.***, 132, 011008.

Proton conducting oxides for solid oxide fuel cells and membrane reactors

Mari-Ann EINARSRUD

Department of Materials Science and Engineering, NTNU

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Mari-Ann EINARSRUD has nearly 25 years of research experience in ceramic and inorganic materials science and engineering. She has published about 130 papers in internationally peer review journals, 22 conference proceedings and holds 2 patents. Her research interests are materials science and engineering with particular focus on synthesis of inorganic and nanostructured materials, sol-gel technology, ceramic powder processing technology, sintering, physical, chemical and mechanical characterization. She has supervised 28 MSc students, 16 PhD candidates, (additional 7 as co-supervisor) and 7 post docs. She received the Esso prize for best doctor thesis (1988). She has been elected member of the executive broad for NTNU for two periods. She is an elected member of Norwegian Academy of Technological Sciences, The Royal Norwegian Society of Sciences and Letters and The Norwegian Academy of Science and Letters.

Selected publications

1 P.I. Dahl, H.L. Lein, Y. Yu, J. Tolchard, T. Grande, C. Kjølseth, T. Norby, R. Haugsrud, M.-A. Einarsrud, Microstructural Characterization and Electrical Properties of Spray Pyrolyzed Conventionally Sintered or Hot-pressed BaZrO3 and $BaZr_{0.9}Y_{0.1}O_3$, ***Sol State Ionics*** 182 (2011) 32-40.

2 A. B. Haugen, I. Kumakiri, C. Simon, and M.-A. Einarsrud, TiO_2, TiO_2/Ag and TiO_2/Au photocatalysts prepard by spray pyrolysis, ***J. Eur. Cer. Soc.***, 31 (2011) 291-298.

3 H. Güleryüz, I. Kaus, C. Filiatre, T. Grande, and M.-A. Einarsrud, Deposition kinetics of silica thin films formed by sol gel method, ***J. Sol-Gel Sci. Tech.***, 54 (2010) 249-257.

4 G. Z. Wang, S.M. Selbach, Y. D. Yu, X. Zhang, T. Grande and M.-A. Einarsrud, Hydrothermal Synthesis and Characterization of $KNbO_3$ nanorods, ***CrystEngComm***, 11 (2009) 1958-63.

5 P-M- Rørvik, T. Grande, and M.-A. Einarsrud, Hierarchical $PbTiO_3$ Nanostructures Grown on $SrTiO_3$ Substrates, J. Crystal Growth Design, 9 (2009) 1979-1984.

6 P.M. Rørvik, K. Tadanaga, M. Tatsumisago, T. Grande, and M.-A. Einarsrud, Template-assisted Synthesis of $PbTiO_3$ Nanotubes, ***J. Eur. Cer. Soc.***, 29 (2009) 2575-2579.

7 P.M. Rørvik, Å. Almli, A.T.J. van Helvoort, R. Holmestad, T. Tybell, T. Grande, and M.-A. Einarsrud, $PbTiO_3$ Nanorod Arrays Grown by Self-Assembly of Nanocrystals, ***Nanotechnology***, 19 (2008) 225605.

Micro-/nanomechanics in the fabrication of biomimetic materials

Xi-Qiao FENG

Department of Engineering Mechanics, Tsinghua University

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Xi-Qiao FENG, is a professor in the Department of Engineering Mechanics at Tsinghua University. He earned his B.Sc. (1990), M.Sc. (1991) and Ph.D. (1995) degrees in Solids Mechanics from Tsinghua University at Beijing. During July 1995 – June 1997, he was a postdoctoral fellow at the Institute of Nuclear Engineering and Technology of Tsinghua University. From September 1997 to May 1999, he was awarded the Alexander von Humboldt of Germany and worked in Technical University of Darmstadt and in Delft University of Technology of the Netherlands. He rejoined Tsinghua University as an associate Professor in June 1999 and was promoted to a full professor in August 2001.

Selected Feng's honors include: Distinguished Young Scholars Award of NSFC (2005), Young Investigator Award of Fok Ying Tong Education Foundation (2004), Award for the Best Doctoral Theses of China (1999), etc.

He has been serving as a member of editorial board of more than 10 academic journals, e.g., *Engineering Fracture Mechanics, Archive of Applied Mechanics, International Journal of Applied Mechanics, Molecular and Cellular Biomechanics, Acta Mechanica Solida Sinica*. He is also the Secretary-General of Chinese Society of Theoretical and Applied Mechanics, and the Director of Institute of Biomechanics and Medical Engineering.

Professor Feng's current interests includes: mechanics of biomaterials, damage and fracture mechanics, and nanomechanics. He has authored and co-authored two books and more than 160 journal papers.

Selected publications

1 Bo Li, Yan-Ping Cao, and Xi-Qiao Feng. Growth and surface folding of esophageal mucosa: A biomechanical model. ***Journal of Biomechanics***, 2011, Vol. 44, No. 1, pp. 182–188.

2 G. K. Xu, X. Q. Feng, and Y. Li, Self-assembled nanostructures of homopolymer and diblock copolymer blends in a selective solvent, ***Journal of Physical Chemistry B***, 2010, Vol. 114, No. 3, pp. 1257–1263.

3 G. K. Xu, Y. Li, B. Li, X. Q. Feng, and H. Gao, Self-assembled lipid nanostructures encapsulating nanoparticles in aqueous solution, ***Soft Matter***, 2009, Vol. 5, No. 20, pp. 3977–3983.

4 Hai-Mu Ye, Jian-Shan Wang, Shuo Tang, Jun Xu, Xi-Qiao Feng, Bao-Hua Guo, Xu-Ming Xie, Jian-Jun Zhou, Lin Li, Qiong Wu and Guo-Qiang Chen. Surface stress effects on the bending direction and twisting chirality of lamellar crystals of chiral polymer, ***Macromolecules***, 2010, Vol. 43, No. 13, pp. 5762–3770.

ZnO nanowire solar cells

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Ursula GIBSON is Professor of Physics at the Norwegian University of Technology, and Adjunct Professor of Engineering and Chemistry at Dartmouth College. Her current research projects include ZnO nanowires for energy conversion and photonic applications, II-VI materials for solar energy, and nanomagnetic logic elements. Physical vapor deposition, electrochemical methods and optical characterization form the core of her research activities, along with modeling and theoretical treatment of optical nanostructures. She has held visiting positions in Sweden, Finland, Germany and Australia, and has held several roles in the American Vacuum Society, the Materials Research Society, and the Optical Society of America, where she was a member of the Board of Directors.

Selected publications

1 Haibo Zeng,* Jingbiao Cui,* Bingqiang Cao,* Ursula Gibson, Yoshio Bando, and Dmitri Golberg, Electrochemical Deposition of ZnO Nanowire Arrays: Organization, Doping, and Properties ***Science of Advanced Materials*** (2010) 2 336-358

2 J. C. Cui and U.J. Gibson "A Simple Two-Step Electrodeposition of Cu2O/ZnO Nanopillar Solar Cells" ***Journal of Physical Chemistry C*** (2010) 114 (14), pp 6408–6412 DOI 10.1021/jp100431

3 S. R. Bowden, K. K. Ahmed, and U. J. Gibson "Longitudinal magneto-optic Kerr effect detection of latching vortex magnetization chirality in individual mesoscale rings" ***Appl. Phys. Lett***., (2007) 91, 232505

4 J. Cui and U. J. Gibson " Low Temperature Fabrication of Single Crystal ZnO Nanopillar Photonic Bandgap Structures" ***Nanotechnology*** (2007) 18 155302

5 Werne, T., Testorf, M. and Gibson, U.J. Local field enhancement in metal-dielectric nano cylinders with complex cross-sections ***JOSA A*** (2006) 23 (9): 2299-2306

Membranes in Energy Processes

May-Britt HÄGG

Dept. of Chemical Engineering. NTNU

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May-Britt HÄGG, Professor at Dept. of Chem. Eng. NTNU, Head of Memfo R&D group since 1994; 16 members (PhDs, post docs, researchers). More than 15 years experience on the following topics: Focus on CO_2 capture from gas streams, H_2-recovery, biogas- upgrading. Membrane separation and membrane material development, Process simulation of integrated membrane processes.

Selected publications

1 M-B Hägg: Membranes in gas separation; in ***Handbook of Membrane Separations: Chemical, Pharmaceutical and Biotechnical Applications***, A. Pabby, A.M. Sastre, S.H.S. Rizvi (eds.); Marcel Dekker (~60 pp), June 2008

2 M.Sandru, T-J Kim, M-B Hägg; High molecular fixed-site-carrier PVAm membrane for CO_2 capture, ***Desalination*** 240 (2009) 298-300

3 L.Shao, J.Samseth, M-B Hägg, Crosslinking and stabilization of nanoparticle filled PMP nanocomposite membranes for gas separation, ***J.Membr. SCi***. 326 (2009) 285-292

4 L.Deng, T-J Kim, M-B Hägg; Facilitated Transport of CO_2 in novel PVAm/PVA blend membrane, ***J.Membr.Sci***., available online May 23rd 2009

5 Grainger, David Ryan; Hagg, May-Britt. The recovery by carbon molecular sieve membranes of hydrogen transmitted in natural gas networks. ***International journal of hydrogen energy*** 2008 ;Volume 33. p. 2379-2388

6 Lindbråthen, Arne; Hagg, May-Britt. Membrane separation of chlorine gas. ***Chemical Engineering and Processing*** 2008 ;Volume 48. p. 1-16

7 Shao, Lei; Samseth, Jon; Hagg, May-Britt. Crosslinking and stabilization of high fractional free volume polymers for gas separation. ***International Journal of Greenhouse Gas Control*** 2008 ;Volume 2. p. 492-501.

8 M.Sandru, S.H. Haukebø, M-B Hägg, Composite hollow fiber membranes for CO_2 capture, ***J.Membr.Sci***., 346 (2010) 172-186

9 L.Deng, M-B Hägg, Techno-economic evaluation of biogas upgrading process using CO_2 facilitated transport membrane ***International Journal of Greenhouse Gas Control***, available online January 2010,

10 Hollow fiber carbon membranes – investigations for CO_2 capture, ***J.Membr Sci***., (2010) in press

5 Patents on development of membranes for CO_2 and H_2 separation

Nanomaterials for Thermal Building Insulation

Bjørn Petter JELLE

- SINTEF Building and Infrastructure, Department of Materials and Structures, Trondheim, Norway.
- Norwegian University of Science and Technology (NTNU), Department of Civil and Transport Engineering, Trondheim, Norway.

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Bjørn Petter JELLE, Senior research scientist at SINTEF Building and Infrastructure and professor at Norwegian University of Science and Technology. His research experiences and interests include: Building physics, material science and technology, accelerated climate ageing experimental investigations, climate exposure, various climate testing including driving rain, solar radiation, thermal radiation, solar cells/photovoltaics, miscellaneous energy aspects, thermal transport, high performance building insulation materials, material and coating evaluation, surface preparation and protection, coating application, cathodic protection design, corrosion and material aspects, conducting polymers, sensor technology, smart windows, electrochromic materials for energy efficient windows, air metal hydride batteries, fuel cell technology, hydrogen energy, electrochemistry, various experimental techniques, physics, mathematics, astronomy, chemistry and pedagogics/teaching.

Selected publications

1 B. P. Jelle, K. Noreng, T. H. Erichsen and T. Strand, "Implementation of Radon Barriers, Model Development and Calculation of Radon Concentration in Indoor Air", ***Journal of Building Physics***, 34, 195-222, 2011.

2 B. P. Jelle and T.-N. Nilsen, "Comparison of Accelerated Climate Ageing Methods of Polymer Building Materials by Attenuated Total Reflectance Fourier Transform Infrared Radiation Spectroscopy", ***Construction and Building Materials***, 25, 2122-2132, 2011.

3 R. Baetens, B. P. Jelle and A. Gustavsen, "Aerogel Insulation for Building Applications: A State-of-the-Art Review", ***Energy and Buildings***, 43, 761-769, 2011.

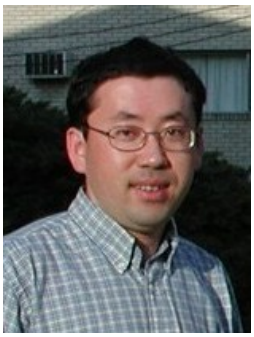
4 E. Wegger, B. P. Jelle, E. Sveipe, S. Grynning, A. Gustavsen, R. Baetens and J. V. Thue, "Ageing Effects on Thermal Properties and Service Life of Vacuum Insulation Panels", Accepted for publication in ***Journal of Building Physics***, 2011.

5 B. P. Jelle, A. Gustavsen and R. Baetens, "The Path to the High Performance Thermal Building Insulation Materials and Solutions of Tomorrow", ***Journal of Building Physics***, 34, 99-123, 2010.

6 R. Baetens, B. P. Jelle, J. V. Thue, M. J. Tenpierik, S. Grynning, S. Uvsløkk and A. Gustavsen, "Vacuum Insulation Panels for Building Applications: A Review and Beyond", ***Energy and Buildings***, 42, 147-172, 2010.

7 R. Baetens, B. P. Jelle and A. Gustavsen, "Properties, Requirements and Possibilities of Smart Windows for Dynamic Daylight and Solar Energy Control in Buildings: A State-of-the-Art Review", ***Solar Energy Materials & Solar Cells***, 94, 87-105, 2010.

FEM based multiscale simulation method



Bin LIU

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Bin LIU, Professor of Solid Mechanics in Center for Nano- and Micro- Mechanics (CNMM), Department of Engineering Mechanics, Tsinghua University. He got his bachelor and PhD degrees majored in mechanics from Tsinghua University in 1996 and 2001, respectively. He spent three years, from 2001 to 2004, working as a postdoctoral research associate in Prof. Yonggang Huang's group at University of Illinois at Urbana-Champaign, the United States. He then visited Germany as a Humboldt research fellow and worked with Prof. Huajian Gao in Max-Plank institute from 2004 to 2005. He returned to China and joined the faculty of Department of Engineering Mechanics, Tsinghua University in 2005. His research interests include multiple scales and multiple physics simulation method, the mechanical properties of carbon nanotube systems and the coupling effect between the mechanical deformation and the electrical properties, biology inspired mechanics, and mechanics of smart and composite materials. He is the editorial board member of International Journal of Plasticity and Journal of Computational and Theoretical Nanoscience. He has published 58 journal articles and 3 book chapters.

Selected publications

1 Zhang ZQ, Liu B*, Huang, Y, Hwang KC, Gao H, (2010), Mechanical properties of unidirectional nanocomposites with non-uniformly or randomly staggered platelet distribution. ***Journal of the Mechanics and Physics of Solids***, 58: 1646–1660.

2 Chen YL, Liu B*, He XQ, Huang Y, Hwang KC, (2010), Failure analysis and the optimal toughness design of carbon nanotube-reinforced composites. ***Composites Science and Technology***, 70(9): 1360-1367.

3 Zhao XJ, Liu B*, Fang DN, (2010), Study on electroelastic field concentration around the electrode tip in multilayer ferroelectric actuators of two designs and their optimizations. ***International Journal of Plasticity***, 26(4): 533-548.

4 Chen YL, Liu B*, Wu J, Huang Y, Jiang H, Hwang KC, (2008), Mechanics of hydrogen storage in carbon nanotubes. ***Journal of the Mechanics and Physics of Solids*** 56(11): 3224-3241.

5 Zhang ZQ, Liu B*, Chen YL, Jiang H, Hwang KC, Huang Y, (2008), Mechanical properties of functionalized carbon nanotubes. ***Nanotechnology*** 19(39), Article Number: 395702.

Nanoscale fuel cells based on nanowires

Jun LUO

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Jun LUO, Associate Professor, Beijing National Center for Electron Microscopy, Department of Materials Science and Engineering, Tsinghua University.

His current research projects include fabrication, structural characterization, property measurement and analysis of nanotubes, nanowires and graphenes as well as their nanodevices for electronics and energy conversion.

Selected publications

1 Jun Luo, Peng Tian, Cheng-Ta Pan, Alexander W. Robertson, Jamie H. Warner, Ernie W. Hill, and G. Andrew D. Briggs, Ultralow Secondary Electron Emission of Graphene, ***ACS Nano***, 2011, accepted.

2 Huiliang Wang, Jun Luo, Alex Robertson, Yasuhiro Ito, Wenjing Yan, Volker Lang, Mujtaba Zaka, Franziska Schäffel, Mark H. Rümmeli, G. Andrew D. Briggs, and Jamie H. Warner, High performance field effect transistors from solution processed carbon nanotubes, ***ACS Nano***, 2010, 4, 6659-6664.

3 Jun Luo, Jamie H. Warner, Chaoqun Feng, Yagang Yao, Zhong Jin, Huiliang Wang, Caofeng Pan, Sheng Wang, Leijing Yang, Yan Li, Jin Zhang, Andrew A. R. Watt, Lian-mao Peng, Jing Zhu, and G. Andrew D. Briggs, Ultrahigh secondary electron emission of carbon nanotubes, ***Applied Physics Letters***, 2010, 96, 213113.

4 Jun Luo, Jing Zhu, Zhipeng Huang, and Lu Zhang, Arrays of Ni nanowire/multiwalled carbon nanotube/amorphous carbon nanotube heterojunctions containing Schottky contacts, ***Applied Physics Letters***, 2007, 90, 033114.

5 Xiaohua Liu, Jun Luo, and Jing Zhu, Size effect on the crystal structure of silver nanowires, ***Nano Letters***, 2006, 6, 408-412.

6 Jun Luo, Yingjie Xing, Jing Zhu, Dapeng Yu, Yonggang Zhao, Lu Zhang, Hui Fang, Zhipeng Huang, and Jun Xu, Structures and electrical properties of Ni nanowire/multi-walled carbon nanotube/amorphous carbon nanotube heterojunctions, ***Advanced Functional Materials***, 2006, 16, 1081-1085.

7 Jun Luo, Zhipeng Huang, Yonggang Zhao, Lu Zhang, and Jing Zhu, Arrays of heterojunctions of Ag nanowires and amorphous carbon nanotubes, ***Advanced Materials***, 2004, 16, 1512-1515.

Bimetallic electrocatalysts for PEM fuel cells

Svein SUNDE

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EDUCATION AND DEGREES

Siv. ing. degree in physics, Norwegian Institute of Technology (NTH), 1988

Dr.ing. degree in electrochemistry, NTH, 1991

Dr.techn. degree, chemistry, Norwegian University of Science and Technology (NTNU), 2000

Doctorat Honoris Causa 2011 at the Lomonosow Moscow State Academy of Fine Chemical Technology (MITHT)

PROFESSIONAL EXPERIENCE

2005-	Professor, Department of Materials Science and Engineering, Norwegian University of Science and Technology (NTNU), Trondheim, Norway
1997-2004	Principal Research scientist/ Research scientist, OECD Halden Reactor Project/IFE, Halden, Norway
1996	Visiting scientist, Materials Department, Risø National Laboratory, Denmark
1991-1995	Research scientist/manager, SINTEF Metallurgy/SINTEF Materials Technology

Selected publications

1 Piotr Ochal, Jose Luis Gomez de la Fuente, Mikhail Tsypkin, Navaneethan Muthuswamy, Magnus Rønning, De Chen, Sergio Garcia, Selim Alayoglu, Bryan Eichhorn, Frode Seland, Svein Sunde, " CO-stripping at Ru@Pt core-shell electrocatalysts", ***J. Electroanal. Chem.***, In press (2011)

2 Lars-Erik Owe, Ingrid Anne Lervik, Mikhail Tsypkin, Marie Vardenær Syre, and Svein Sunde, "Electrochemical behaviour of iridium oxide films in trifluoromethanesulfonic acid", ***J. Electrochem. Soc***., 157 (2010) B1719

3 A. B. Ofstad, M. S. Thomassen, J. L. Gomez, F. Seland, S. Møller-Holst, and S. Sunde, "Assessment of platinum dissolution from Pt/C fuel cell catalyst: An electrochemical quartz crystal microbalance study", ***J. Electrochem. Soc***., 157 (2010) B621

4 I. A. Lervik M. Tsypkin, L.-E. Owe, S. Sunde, "Electronic structure versus electrocatalytic activity of iridium oxide", ***J. Electroanal. Chem***. 645 (2010) 135

5 S. Sunde, I. A. Lervik, L.-E. Owe, and M. Tsypkin, "Impedance analysis of nano-structured iridium oxide electrocatalysts", ***Electrochimica Acta***, 55 (2010) 7751

6 S. Sunde, I. A. Lervik, L.-E. Owe, and M. Tsypkin, "An Impedance Model for a Porous Intercalation Electrode with Mixed Conductivity", J. Electrochem. Soc., 156 (2009) B927

Fracture of Silicon – a bottom up approach

Christian THAULOW

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Norwegian University of Science and Tecnology

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Christian THAULOW, Professor of Mechanics of Materials, Fracture Mechanics. His research interests include atomistic- and multiscale materials modeling and testing. The atomistic modeling includes the understanding of the intrinsic brittleness of silicon, which puts restrictions on a safe and durable application in energy systems. The multiscale modeling has been based on the Quasicontinuum approach, but is now further developed to account for temperature and 3D effects. Procedures have been developed at NTNU Nanolab for machining pillars and fracture specimens. Nanoindentation is performed in combination with in-situ hydrogen charging to examine embrittlening mechanisms. Biomimic approaches include slice&view and FIB machining of the cuticula of crabs and the possibility to deposit CNT directly on steel surfaces by PECVD.

Selected publications

1 Ackbarow T, D Sen, C Thaulow and M J Buehler (2009), "Alpha-Helical Protein Networks are Self Protective and Flaw Tolerant" ***PLoS ONE***, 4(6)

2 Sen D, C Thaulow, S V. Schieffer, A Cohen and M J Buehler (2010) "Atomistic Study of Crack-Tip Cleavage to Dislocation Emission Transition in Silicon Single Crystals", ***Physical Review Letters*** 104, 235502, 10 June.

3 Thaulow C, D Sen, M J Buehler, (2010) "Effect of atomistic surface steps on the brittle to ductile transition of silicon" ***Multiscale Material Modeling***, Int Conf, Freiburg, Oct

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5 Thaulow C, D Sen, S V Schieffer, M J Buehler, (2010) "Atomistic insight into the brittle to ductile transition of silicon" ***European Conf on Fracture***, ICF18 Sept Dresden, Germany

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Structure control and mass production of carbon nanotube arrays

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Fei WEI, Professor, the director of Beijing Key Laboratory of Green Chemical Reaction Engineering & Technology at Tsinghua University, he is vice president of president of Chinese Society of Particuology.

His current research projects include carbon nanotube mass production, downer reactor, multistage turbulent fluidized bed, coal to chemical processes. A full range of theoretical to practical applications is studied in problems as varied as the gas solids flow structure of gas-solid turbulent flow, carbon nanotube production, nano powder characterization and flow, optimum design of catalytic fluidized bed reactors. He has more than 300 journal published papers and has experience of successfully design more than 30 industrial fluidized bed reactor.

Selected publications

1 Meng-Qiang Zhao, Qiang Zhang, Wei Zhang, Jia-Qi Huang, Yinghao Zhang, Dang Sheng Su, and Fei Wei, Embedded High Density Metal Nanoparticles with Extraordinary Thermal Stability Derived from Guest-Host Mediated Layered Double Hydroxides, ***J. AM. CHEM. SOC***, 2010, doi:10.1021/ja106421g

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III-V nanowires for high-efficiency solar cells

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Helge WEMAN, is a Professor of Nano-electronics and Nano-photonics, at Norwegian University of Science and Technology (http://www.iet.ntnu.no/~weman/). Since 2005 he leads a research group of about ten researchers that fabricate and characterizes nano-scale semiconductor materials and devices for use as e.g. energy efficient light emitters and solar cells. Heterostructured III-V semiconductor nanowires are grown with atomic precision using Au and self-catalyzed molecular beam epitaxy. Processing of the nanowire devices is done by e.g. electron beam lithography, nanoimprint and focused ion beam techniques using NTNU NanoLab.

At the workshop he we will present the latest results from his research group as wells from the partners in the Nordic Consortium project on "Semiconductor nanowire based solar cells" (NANORDSUN) that he is coordinating during 2010-2013. The objective is to find the most energy efficient nanowire solar cell with an optimum design solution for low cost.

Selected publications

1 D.L. Dheeraj, G. Patriarche, H.L. Zhou, T.B. Hoang, A.F. Moses, S. Grønsberg, A.T.J. van Helvoort, B.-O. Fimland, and H. Weman, Growth and characterization of wurtzite GaAs nanowires with defect-free zinc blende GaAsSb inserts, ***Nano Lett***. 8, 4459 (2008).

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http://sciyo.com/books/show/title/nanowires

Solving the Energy Crisis: From Nature to Engineering

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Zhiping XU, Associate Professor of Engineering Mechanics, School of Aerospace and Center for Nano and Micro Mechanics, Tsinghua University. My recent interests focus on the energetic processes in nanoscale and biological materials, also their impacts on the sustainable energy industry. More information can be found at http://www.cel-tsinghua.org. In this talk, I will present our efforts along the way developing novel materials and devices for energy applications.

Selected publications

1 Z. Xu and M. J. Buehler, Interface structure and mechanics between graphene and metal substrates: a first-principles study, ***Journal of Physics: Condensed Matter*** 22(48), 485301-5 (2010)

2 Z. Xu and M. J. Buehler, Mechanical energy transfer and dissipation in fibrous beta-sheet rich proteins, ***Physical Review E*** 81 (6), 061910-6 (2010)

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Submicro particle deposition: the role of electric field

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His research interests include: i) combustion theory and technology especially pulverized coal combustion; ii) Clean Coal Technology; iii) Combustion emission and its control; iv) Particulate Matters formation and characteristics

Selected publications

1 Yan, Wen; Li, Shuiqing; Zhang, Yiyang; Yao, Qiang, Effects of Dipole Moment and Temperature on the Interaction Dynamics of Titania Nanoparticles during Agglomeration, ***JOURNAL OF PHYSICAL CHEMISTRY C***，2010, 114 (24), pp 10755–10760

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ZnO Nanomaterials and Nanodevices for Energy

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Yue ZHANG. PHD, Professor, vice-president of University of Science and Technology Beijing. He has been awarded the financial support for outstanding young scientist foundation of China and cross century excellent talent training project of the Ministry of Education of China, excellent paper award from project supported by NSFC for the first time, young subject leader of high education in Beijing, and hold government subsidies from the State Council of China.

Since he started carried in research and education, he is responsible and participated more than 30 major research projects from the state and provincial governments. He have achieved first class award for National Science in National Science and Technology award nominated by the MOE, two times first class award and two times second class awards of the progress in science and technology from the MOE, two times awards for progress in science and technology from the Ministry of Metallurgy Industry, second class award for progress in science and technology from the Beijing Government. First class awards from achievement in education from the Beijing government. He published more than 250 papers in the recent 10 years, more than 200 papers were cited by SCI and EI, and more than 1000 times cited by others, nearly 200 times for a single paper. He co-authorized 6 books, he applied over 20 patents, and approval over 15 patents. He is a member of the editorial board of 5 journals. His most recent research focuses on zinc oxide nanowires and nanobelts, in-situ techniques for nano-scale measurements, self-assembly nanostructures, nanodevices and nanodamages.

Selected publications

1 Ya Yang, Wen Guo, Junjie Qi, and Yue Zhang, Flexible piezoresistive strain sensor based on single Sb-doped ZnO nanobelts, ***Appl. Phys. Lett.,*** 2010, 97, 223117

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Graphene and carbon nanotubes based hierarchical structure nanocomposites

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Dr. Zhang was a German Alexander von Humboldt Sofja Kovalevskaja Award winner between 2001 and 2005. He serves as editorial board members of 6 leading academic journals in the fields of composites, e.g. Composites Science and Technology, Composites Part A, Journal of Composite Materials, etc. He currently serves as the Vice President of the Chinese Society of Particuology, and the Deputy Secretary General of the Chinese Society for Composite Materials. He published more than 100 refereed papers in SCI journals, which have been cited for more than 600 times by others in the past five years. He published also a co-edited book (by Springer), 6 book chapters, 4 European patents, and 10 Chinese patents.

Selected publications

1 Liu LQ, Ma WJ, Zhang Z*: Preparation and property of macroscale carbon nanotube assemblies: a review of fundamental and applied aspects. ***Small*** 2011; 7: invited review.

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Wetting and transporting at nano and micro scale for clean and energy

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Vice President of Chinese Society of Theoretical and Applied Mechanics

Research Interests:
Nanomechanics, nano-devices, micro/nano-bionics; mechanics of heterogeneous materials, damage mechanics; mechanics of anisotropic behavior, theory of representations for tensors and tensor functions.

Selected publications

1 Zheng QS, Lv CJ, Hao PF, Sheridan J, Small is beautiful, and dry, ***Science China-Physics Mechanics & Astronomy***, 53(12), 2245-2259

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Growth mechanism and photovoltaic applications of grapheme

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Selected publications

1 Z. Li, H. W. Zhu, K. L. Wang, J. Q. Wei, X. C. Gui, X. Li, C. Y. Li, L. L. Fan, P. Z. Sun, D. H. Wu. Ethanol flame synthesis of highly transparent carbon thin films. ***Carbon*** 2011, 49, 237.

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Nanowire-Based Biofuel Cells for Self-Powering Nanosyste

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Jing ZHU, a member of Chinese Academy of Science, is one of the pioneers in analytical electron microscopy field in China. She has been engaging in developing electron microscopy for characterization of crystal structure, deformation structure and electronic structure and doing applied fundamental research in metals, alloys, functional ceramics, nano- materials.From the late 1960s to late 1980s, Prof. Zhu and her colleagues investigated alloying principle and the toughening method in high-strength steel, based on their research, a rational heat treatment system and alloying way which are adopted in the engineering applications were suggested. Her research interests include: Nano-materials and Nano-structure, Interface and Surface in Materials, Electron Microscopy in Material Science, Research and Development of in-situ specimen holder in Electron Microscope.

Selected publications

1 Lu, N., Wan, Q., Shi, Y., Zhu, J., 2010a. Synthesis and Structural Characterization of Single Crystalline Zigzag SnO2 Nanobelts. ***JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY*** 10, 7787-7790.

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