Research Centre for Sustainable Solar Cell Technology

SUSOLTECH

The Norwegian Research Centre for Sustainable Solar Cell Technology

Norwegian Solar Cell Conference 2018

May 2nd - 3rd in Son

Program and practical information

Quality Spa hotel in Son May 2nd - 3rd

Welcome!

It is our great pleasure to welcome you to beautiful Son and the Norwegian Solar Cell Conference 2018! The conference is arranged by IFE, NMBU, NTNU, SINTEF, the University of Agder and the University of Oslo in collaboration with the Research Centre for Sustainable Solar Cell Technology. For two days, you will join the Norwegian solar cell community for updates on exciting scientific, technological and industrial developments in the currently fastest growing renewable energy technology available. We are proud to present a scientifically strong program covering most important topics along the entire production value chain for solar electricity, from raw material production, through silicon crystallization and solar cell manufacture, to end use in solar energy systems. The full program, alongside practical information about your participation in the conference and the stay here in Son, is found on the following pages. We hope you take this unique opportunity to engage in discussions of critical issues for the development of solar electricity solutions, to interact with colleagues and students from research and industry, and to become better acquainted with your solar colleagues over a cup of coffee, lunch or dinner, in beautiful surroundings on the shores of Oslofjorden.

We wish you a successful conference!

On behalf of the conference committee

Merete Estensen
Centre Coordinator
Research Centre for Sustainable
Solar Cell Technology

Practical information

PRACTICAL INFORMATION FOR PRESENTERS

If you give an oral presentation, please make sure bring an USB stick and install you presentation at the latest at the beginning of the last break prior to your presentation. The organizing committee will be on site and glad to give you any assistance you might need. If you are a poster presenter, your poster should be put up as early as possible, and at the very latest before last break (14.00) before poster presentation Wednesday at 16.00. Make sure to be back in good time for the following session!

FOOD AND DRINK

Lunch will be served between 12.00-13.00. Hopefully we can all enjoy the meal outside in beautiful, sunny weather. Breakfast Thursday morning is served between 07.00 and 09.00. As indicated in the program, there will be coffee breaks, as well as lunch.

In the afternoon break 17.30 – 19.00, there will be possibilities to take a walk in Son centrum with its small streets and old buildings, or just relax and maybe enjoy the spa at the hotel.

Dinner is served at 19.00 Wednesday night. With dinner, two units of drink are included.

SCHEDULE AND TRANSPORTATION

Wednesday May 2nd, the conference registration takes place from 9.30 – 9.55 in the hotels reception.

The first lecture of the conference starts precisely at 10.00 Wednesday May 2nd.

The conference ends at 16.00 on Thursday May 3rd.

Since a lot of participants will travel from Oslo or through Gardermoen Airport, a shuttle bus with a departure time set to Wednesday May 3rd at 16.15 has been commissioned. The shuttle bus will go from Quality Spa hotel to Gardemoen Airport with only two stops along the way: Ryen subway station in Oslo and Olavsgaard. It is important to get feedback if you want to make use of this offer. Please contact the reception at the hotel and add your name at the list. (The bus leaves on time!).

During your stay you will have free access to the spa area on the 1st floor. For more information regarding the facilities at Son Quality Spa, please contact the hotel. The hotel offers a smoke-free environment. All the facilities and devices at the hotel are therefore non-smoking.

If you have any other questions with respect to the conference, please do not hesitate to contact:

Merete Estensen (merete.estensen@ife.no) or Linda Orø (linda.oro@ife.no)

The hotel rooms will be ready for check in from 15.00 the arrival date!

Departure day check out before 10.00

WE WISH YOU A WONDERFUL STAY!

Program Norwegian Solar Cell Conference 2018

Wednesday May 2nd

	Introduction		
10.00	Opening Session and welcome	Erik S. Marstein	IFE
	Silicon feedstock		
	Chair:	**Jafar Safarian**	**NTNU**
10.30	Solar Si production at REC Solar Norway	Adrian Murgau	REC Solar Norway
11.00	Identification of higher-order silanes during monosilane pyrolysis by GCMS	Guro Marie Wyller	IFE
11.15	Effect of ultra-high temperatures on phosphorus removal from Si in vacuum refining process	Arman Hoseinpur	NTNU
11.30	Hydrochloric Acid leaching of Mg-doped Si for solar grade feed-stock production	Mengyi Zhu	NTNU
11.45	Grain Boundary Segregation of Phosphorus in Multicrystalline Silicon by Doping Alkaline-earth Metals	Kai Tang	SINTEF
12.00	Lunch		
	Ingots, Crucible & Wafers I		
	Chair:	**Mari Juel**	**SINTEF**
13.00	In-Situ synchrotron x-ray investigations of dislocations during melting and growth of silicon crystals	Gaute Stokkan	SINTEF
13.15	Structure loss in Cz silicon ingots	Øyvind S Sortland	NTNU
13.30	Preliminary investigations on quartz crucibles and their role on multicrystalline silicon ingot quality	Jochen Busam	NTNU
13.45	Degradation and degeneration due to recombination active BO-complexes	Rune Søndenå	IFE
14.00	Coffee Break		
	Ingots, Crucible & Wafers II		
	Chair:	**Espen Olsen**	**NMBU**
14.30	Simulation of silicon nucleation and growth on SiN3 coating by phase field modelling	Sylvain Gouttebroze	SINTEF
14.45	Investigation of HPMC-Si by Laue X-Ray Diffraction	Ivar Furu	NTNU
15.00	Modelling phase transformations in silicon materials	Ingeborg-Helene Svenum	SINTEF
15.15	Deep levels of hydrogen-related defects in n-type silicon	Ilya Kolevatov	UiO
15.30	Numerical device simulation of temperature coefficients in com-pensated silicon solar cells	Halvard Haug	IFE
16.00	**Poster Session & something to eat**		
19.00	Conference Dinner		

Thursday May 3rd

	Solar cells and module technology I		
	Chair:	**Edouard Monakhov**	**UiO**
9.00	How is oxygen introduced in Cu2ZnSnS4 solar cell processing?	Sigbjørn Grini	UiO
9.15	Functionalizing optical properties of self-assembled Al nanowires and nanotunnels in Si	Torunn Kjelstad	UiO
9.30	CO2 laser-induced directional recrystallization of SiGe-core fibers characterization and analysis	Wei Wu	NTNU
9.45	Efficiency enhancement mechanisms in nanostructured ultrathin silicon solar cells	Rozalia Lukacz	NMBU
10.00	Strain dependent defect ionization energies in Cuprous Oxide	Heine Riise	UiO
10.15	Coffee Break		
	Solar cells and module technology II		
	Chair:	**Sean Erik Foss**	**IFE**
10.45	Extraction of barrier heights of Pd and Pt Schottky diodes on hydrogenated TiO2	Julie Bonkerud	UiO
11.00	Nitrogen Doping of Sputtered Cuprous Oxide Thin Films by Ion Implantation	Martin Nyborg	UiO
11.15	Testing of Building Integrated Photovoltaics Beyond the Standards	Anna Fedorova	NTNU
11.30	Architectural integration, challenges and possibilities	Barbara Szybinska Matusiak	NTNU
11.45	Efficiency of coloured BIPV	Tore Kolås	SINTEF
12:00	Lunch		
	End use and impact I		
	Chair:	**Josefine Selj**	**IFE**
13.00	Research-based design of PV plants on commercial buildings in Norway	Trygve Mongstad	FUSen
13.15	Environmental challenges related to PV unit's production, operation and decommissioning	Juliette Leyris	Statoil
13.30	Monitoring of PV System Performance and Degradation	Anne Gerd Imenes	UiA
13.45	Production forecasting and fault detection using machine learning	Åsmund Skomedal	IFE
14.00	Coffee Break		
	End use and impact II		
	Chair:	**Anne Gerd Imenes**	**UiA**
14.30	Snow load reduction on flat roofs using a PV system in heating mode	Iver Frimannslund	Multiconsult
14.45	Technical assessment of a snow mitigation solution for rooftop PV systems	Bjørn B. Aarseth	UiO/IFE
15.00	Quality controlled performance analysis of PV systems	Mari Øgaard	UiO/IFE
15.15	Running in packs or walking alone? Exploring innovation system building strategies along the solar PV supply chain	Jens Hanson	UiO
15.30	Thanks & Closure	Erik S. Marstein	IFE
16.15	**Bus Departure**		

Poster session Norwegian Solar Cell Conference 2018

Wednesday May 2nd 16.00-17.30

1. Combined refining of silicon at the Norwegian laboratory for silicon-based solar cell technology.
   Jafar Safarin, Eivind Øvrelid

2. Annealing Kinetics of the carbon–dioxygen complex in proton irradiated p-type Si
   H. M. Ayedh, A. A. Grigorev, A. Galeckas, B. G. Svensson and E. Monakhov

3. A hyperspectral photoluminescence imaging study of oxygen related defects in CZ-silicon material in the temperature range of thermal donors
   Malin Helander, Espen Olsen, Torbjørn Mehl, Rune Søndanå and Ingunn Burud

4. Study of higher-order oxygen-related defects in Si using FT-IR spectroscopy
   Philip M. Weiser, Edouard V. Monakhov, and Bengt G. Svensson

5. Exploring the activation barriers of dislocation generation from grain boundaries in silicon with atomistic modelling.
   Simen Nut Hansen Eliassen

6. Thermal stability and electronic properties of defects in high-dose proton irradiated
   A. A. Grigorev, H. M. Ayedh, A. Galeckas, B. G. Svensson, and E. V. Monakhov

7. Temperature sensing using luminescent thin-films
   Michael Getz, Ola Nilsen, Per-Anders Hansen

8. Hyperdoped silicon for intermediate band solar cells
   Hogne Lysne, Heidi Sæverud Hauge, Mohammadreza Nematollahi, Marisa Di Sabatino, Randi Holmestad and Turid Reenaas

9. Theoretical studies of optoelectronic properties of kesterite type Cu2ZnSnS4 (CZTS) and thin film solar cells
   D. Mamedov, M. Klopov, and S. Zh. Karazhanov

10. Exploring networks for knowledge development and diffusion in technological innovation systems
    Maria Tsouri & Jens Hanson

11. Epitaxial growth of silicon by electron beam evaporation deposition
    M. Stange, R. Dahl-Hansen, T.O. Sunde, A. S. Azar, A. Ulyashin

12. Dynamic observation of dislocation generation and interaction with grain boundaries during directional solidification of silicon.
    M.G. Tsoutsouva, G. Stokkan, B. Ryningen2, T. Riberi – Béridot, G. Regula, G. Reinhart, N. Mangelinck-Noël

13. Effects of Shading on PV Power Production in Norwegian Climates
    Carolyn Willems

14. Silicon surface passivation by PEDOT:PSS functionalized by SnO2 and TiO2 nanoparticles
    M. García-Tecedor, S. Z. Karazhanov, G.C. Vásquez, H. Haug, D. Maestre, A. Cremades, M. Taeño, J. Ramirez-Castellanos, J.M. González-Calbet, J. Piqueras, C.C. You, E.S. Marstein

15. Numerical Analysis of Thermal Donors Effect on the Quality of Czockralski Growth Silicon Crystal
    Moez Jomâa, Mohammed MHamdi, John Atle Bones, Mari Juel, SINTEF Industry

List of participants

First name	Last name	Company
Adrian	Murgau	Elkem Solar
Aleksei	Grigorev	UiO
Andreas	Bentzen	Otovo
Andrejs	Mlijevskis	Solitek
Anna	Fedorova	NTNU
Anne Gerd	Imenes	UiA
Annett	Thøgersen	SINTEF
Arman	Hoseinpur Kermani	NTNU
Arve	Holt	IFE
Astrid Marie	Muggerud	The Quartz Corp
Barbara	Matusiak	NTNU
Basant	Paudyal	UiA
Birgit	Ryningen	SINTEF
Bjørn Brevig	Aarseth	UiO
Carolyn	Willems	NTNU/SINTEF
Chang Chuan	You	IFE
Eduard	Monakhov	UiO
Egidija	Jaseliunaite	Solitek
Eivind	Seim	NMBU
Erik	Marstein	IFE
Erik	Rønneberg	Sunphade
Espen	Olsen	NMBU
Gaute	Stokkan	SINTEF
Geir Remo	Fredriksen	Statoil
Guro Marie	Wyller	IFE
Hallgeir	Klette	IFE
Halvard	Haug	IFE
Heine Nygard	Riise	UiO
Hogne	Lysne	NTNU
Hussein	Ayedh	UiO
Håkon J. D.	Johnsen	NTNU
Ilia	Kolevatov	UiO
Ingeborg-Helene	Svenum	SINTEF
Ingunn	Burud	NMBU
Ingvild Thue	Jensen	SINTEF
Iver	Frimannslund	Multiconsult
Jafar	Safarian	NTNU
Jens	Hanson	UiO
Jochen	Busam	NTNU
Josefine	Selj	IFE
Julie	Bonkerud	UiO
Juliette	Leyris	Statoil
Junjie	Zhu	IFE
Jørn	Paus	Statoil
Kai	Tang	SINTEF
Kari	Moen	The Quartz Corp
Kevin	Lim	NTNU
Klaus Magnus	Johansen	UiO
Linda	Orø	IFE
Lisa	Kvalbein	IFE

Malin Iris	Helander	NMBU
Maren Anna	Brandsrud	NMBU
Mari	Juel	SINTEF
Mari	Øgaard	UiO
Maria	Tsoutsouva	NTNU
Marie	Syre Wiig	IFE
Marit	Stange	SINTEF
Marte	Skare	IFE
Martin	Nyborg	UiO
Mengyi	Zhu	NTNU
Merete	Estensen	IFE
Michael	Getz	UiO
Moez	Jomâa	SINTEF
Mustafa	BALCI	NTNU
Ola	Nilsen	UiO
Per-Anders	Hansen	UiO
Philip	Weiser	UiO
Ragnhild	Bjelland-Hanley	Solenergiklyngen
Rozalia	Lukacs	NMBU
Rudie	Spooren	SINTEF
Rune	Søndenå	IFE
Sean Erik	Foss	IFE
Sigbjørn	Grini	UiO
Simen Nut Hansen	Eliassen	NTNU
Smagul	Karazhanov	IFE
Sverre	Sørensen	Dynatec
Sylvain	Gouttebroze	SINTEF
Thomas	Preston	IFE
Thomas	Sky	UiO
Tor Håkon	B. Nøklebye	OBOS Prosjekt
Tore	Kolås	SINTEF
Torunn	Kjeldstad	UiO
Trond Inge	Westgaard	Norges forskningsråd
Trygve	Mongstad	Solenergi FUSen
Unni Ingvild	Musdalslien	Statoil
Vebjørn	Bakken	UiO
Wei	Wu	NTNU
Werner	Filtvedt	Dynatec
Yu	Hu	NorSun
Øyvind Sunde	Sortland	NTNU
Åsmund	Skomedal	IFE

On behalf of FME SUSOLTECH- Research Centre for Sustainable Solar Cell Technology

Welcome back to next year´s conference!