The Norwegian PV research centre

FME SOLAR

# Norwegian Solar Cell Conference 2025

May 20th – 21st in Son

# Program and practical information

## Son Spa hotel in Son May 20th – 21st

Welcome!
It is our great pleasure to welcome you to beautiful Son and the Norwegian Solar Cell Conference 2025. The conference is arranged by the Research Centre FME SOLAR in collaboration with IFE, NMBU, NTNU, SINTEF, the University of Agder and the University of Oslo.

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*
FME SUSOLTECH

# Practical information

## PRACTICAL INFORMATION FOR PRESENTERS

If you give an oral presentation, please email your presentation to per-anders.hansen@ife.no before Monday 19th at 12 o'clock. You can also bring an USB stick before the first session starts on your respective day. 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 Tuesday May 20th at 13.30.

Make sure to be back in good time for the following session!

the conference registration takes place from 10.00 to 10.30 in the conference area at the hotel.

## FOOD AND DRINK

Lunch will be served between 11.30 and 12.30 Tuesday and Wednesday. Breakfast Wednesday morning is served from 07.00. As indicated in the program, there will be coffee breaks, in addition to lunch.

You are welcome to a glass of refreshments in the bar from 18.30 Tuesday evening. Dinner is served in the restaurant at 19.00. With dinner, two units of drink are included.

Beverage outside the meals during the conference and from the minibar is not included in the conference fee and shall be paid in the reception when you are checking out from the hotel.

## AFTERNOON

In the afternoon break from 17.00 to 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 pool and spa at the hotel.

## SCHEDULE AND TRANSPORTATION

On Tuesday May 20th, the conference registration takes place from 10.00 to 10.30 in the conference area at the hotel.

The conference bus from will leave from the bus stop at the following times corresponding with train R21 from Oslo S.

May 20th: We will transport from Sonsveien Station to Son Spa

- 8.00 Departure Sonsveien Station (correspond with night train from Trondheim).
- 10.00 Departure Sonsveien Station

May 21st. We will arrange transport from Son Spa to Sonsveien Station after the conference, but if you want to make use of this offer it is important that you make the registration via the Registration link: NSCC 2025 - Bus Transport Information & Registration

15.10 Departure from Son Spa to Sonsveien Station. Please note that the bus leave on time!

There is taxed indoor parking at the hotel and four charge station for EL cars.

## SON SPA:

The hotel rooms will be ready for check in from 15.00 the arrival date. Your room key will be placed outside the conference room.

Access to the SPA area is included in your stay, this must be booked individually via the link: BOOKING SPA AREA, (Limited with entrances, should be booked well in advance).

For more information regarding the facilities at Son Spa, please contact the hotel. The hotel offers a smoke-free environment. All the facilities and devices at the hotel are therefore non-smoking. Please also see www.sonspa.no for more information

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

Merete Estensen (merete.estensen@ife.no)

Departure day check out is at 10.00

WE WISH YOU A WONDERFUL STAY!

# Program Norwegian Solar Cell Conference 2025

## Tuesday - May 20th

| | | | |
|---|---|---|---|
| 10:00 | Conference Registration | | |
| | **SESSION 1: Updates on PV today/ Chair: Kristin Bergum (IFE)** | | |
| 10:30 | An update on the PV industry | Erik S. Marstein | IFE |
| 10:50 | An update from IEA-PVPS | Jarand Hole | NVE |
| 11:00 | PV in Norway - status and important processes | Trine K. Berentsen | Fornybar Norge |
| 11:15 | Extending the lifetime of fused quartz crucibles in Czochralski silicon production | Gabriela K. Warden | NTNU |
| 11:30 | Lunch | | |
| | **SESSION 2: Silicon/ Chair: Marisa Di Sabatino (NTNU)** | | |
| 12:30 | A first look on Antimony-doped n-type Czochralski silicon wafers | Rune Søndenå | IFE |
| 12:45 | Enhancing PV silicon crystal growth through Czochralski furnace simulation | Nagarajan S. Ganesan | SINTEF |
| 13:00 | FT-IR studies of Hydrogen species in Si wafer during Light Soaking | Nicole Aßmann | UiO |
| 13:15 | Melting behavior of Si-kerf agglomerates and characterization of kerf loss waste | Tinotenda Mubaiwa | NTNU |
| 13:30 | Coffee Break | | |
| | **SESSION 3: Solar Cell Technologies/ Chair: Espen Olsen (NMBU)** | | |
| 14:00 | Increasing specific power and the emergence of new markets for crystalline silicon PV | Matthew Wright | University of Oxford |
| 14:15 | Electrically Conductive Adhesives (ECA) for PV module assembly | Helge Kristiansen | Conpart |
| 14:30 | Phase segregation mapping in perovskite solar cells using hyperspectral photoluminescence imaging | Ivar Loland Råheim | NMBU |
| 14:45 | Band gap optimization of multijunction cells with up to six subcells | Rune Strandberg | UiA |
| 15:00 | Thin film top cell absorbers for multijunction solar cells | Snorre B. Kjeldby | UiO |
| 15:15 | Group Photo (outside if possible) | | |
| | Grab a bite | | |
| 15:30 | **Poster session** | | |
| 18:30 | Aperitif in the bar | | |
| 19:00 | Conference Dinner in the Restaurant | | |

# Wednesday - May 21st

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|---|---|---|---|
| | **SESSION 4: Design, operations and maintenance of PV power plants / Chair: Heine Nygard Riise (IFE)** | | |
| 09:00 | Short-term PV power forecasting using spatially resolved production data | Magnus Moe Nygård | IFE |
| 09:15 | A fast and accurate raytracing approach for assessing performance of mono-and bifacial PV modules in complex irradiance | Arnkell J. Petersen & Iver Frimannslund. | NMBU |
| 09:30 | Trends in the Norwegian solar resource during the period 1991–2020 | Erik Berge | MET |
| 09:45 | Finding the needle in a 100 MWp haystack - O&M of utility-scale PV power plants | Marie Syre Wiig | IFE |
| 10:00 | Best Posters Awards | | |
| 10:10 | Coffee Break | | |
| | **SESSION 5: Grid and energy systems integration of PV / Chair: Heidi Nygård (NMBU)** | | |
| 10:30 | Voltage compensation in a solar power plant | Torfinn Årdalsbakke | Eidsiva |
| 10:45 | Zerbst solarpark | Fredy Ernesto Canizares Nino | Statkraft |
| 11:00 | How the Norwegian virtual self-consumption scheme affects profitability of PV | Jarand Hole | NVE |
| 11:15 | Hybridization of solar PV and wind in the Nordics, how to handle ice, snow and curtailment | Sigbjørn Grini | Norconsult |
| 11:30 | Lunch | | |
| | **SESSION 6: Nordic conditions and Agri-PV / Chair: Gaute Stokkan (SINTEF)** | | |
| 12:30 | Analyzing and modeling snow loss in ground-mounted PV systems | Mari B. Øgaard | IFE |
| 12:45 | Frozen Watts: the impact of snow deposition on photovoltaic power output | Mattia Manni | NTNU |
| 13:00 | The spatial potential for agrivoltaics to address energy-agriculture land use conflicts | Richard J. Randle-Boggis | SINTEF |
| 13:15 | Modelling and validation of crop yields in Nordic vertical solar parks | Erlend Hustad Honningdalsnes | IFE |
| 13:30 | Coffee Break | | |
| | **SESSION 7: Floating PV and roadside PV / Chair: Mari Øgaard (UiA)** | | |
| 14:00 | Status of the nearshore floating PV technology BRIZO | Eirik Bøckmann | Fred. Olsen 1848 |
| 14:15 | Operating temperature of floating PV and its effect on performance and reliability | Torunn Kjeldstad | IFE |
| 14:30 | Floating PV in Europe – technology and main market trends | Josefine Selj | IFE |
| 14:45 | The Furulund Kro Pilot Roadside PV project | Knut Braathen | Hafslund |
| 15:00 | Closing remarks | | |
| 15:10 | Bus Departure from Son Spa to Sonsveien Station | | |
| | The bus leaves on time! | | |
| 15:30 | FME SOLAR General Assembly | | |
| | The meeting will be arranged directly following the Norwegian Solar Cell Conference (NSCC) | | |

# Poster session Norwegian Solar Cell Conference 2025

## Tuesday May 20th 15.30-17.00

1. **A spatially resolved clear-sky filter using photovoltaic modules as cloud detectors**
   *Elin Dypvik Sødahl, Magnus Moe Nygård, and Marie Syre Wiig (IFE)*

2. **Elucidating uncertainty in bifacial photovoltaic gain estimation**
   *Magnus Moe Nygård, Marie Syre Wiig, Nathan Roosloota, Gaute Otnes, Mari B. Øgaard, Heine Nygard Riise, and Erik Stensrud Marstein (IFE)*

3. **Short-Term PV power forecasting using time-series decomposition and machine learning: A case study in Trondheim, Norway**
   *Berhane Darsene Dimd and Alfredo Sanchez Garcia (SINTEF)*

4. **Optimizing the Performance of Bifacial PV Modules Through Ground Albedo Enhancement**
   *Dounia Dahlioui, Anne Gerd Imenes, Ingar Alvaro Høye (UiA, Solkraft Sør)*

5. **Seasonal Thermal Energy Storage of Excess PV During Summer for Spacing Heating in Fall: A Case for Skjetlein School, Trondheim**
   *Mulu Bayray Kahsay, Steve Völler (NTNU)*

6. **Electrical Safety and Reliability Analysis of Grid-Connected Household PV Systems in Norway**
   *Rade Ciric, Eivind Lundemoen Hakedal, Oddvin Tesaker Pedersen, Knut Ola Dorum (UIA)*

7. **Recycling end-of-life PV modules: Laser separation**
   *Per-Anders Hansen, Rune Søndenå (IFE)*

8. **Exploiting circular manufacturing and standardization within integrated PV**
   *Sigrid Rønneberg, Chang Chuan You, Mario Silva (iFE)*

9. **EMPOWER: Alternative processes and equipment for advanced manufacturing of PV technologies to boost the European energy independence**
   *Helge Malmbekk, Junjie Zhu (IFE)*

10. **Passivating edges in cut solar cells**
    *Kristin Bergum, Chang Chuan You, Per-Anders Hansen, Junjie Zhu (IFE)*

11. **Zero Busbar interconnections for the future PV modules**
    *Junjie Zhu, Helge Malmbekk, Helge Kristiansen (IFE/ Conpart)*

12. **Analysis of Light-Induced Degradation in Bifacial PV Modules Through Differential Photoluminescence Imaging**
    *Solveig Pettersen (NMBU)*

13. **Solar silicon recycling from End-of-Life PV silicon modules via chemical and vacuum refining techniques**
    *Jonas Låstad, Jafar Safarian (NTNU)*

14. **Correlating Structure Loss and Operational Conditions in Czochralski Silicon Ingot Growth using Machine Learning**
    *Alfredo Sanchez, Rania Hendawi, Hendrik Schön, Marisa Di Sabatino (SINTEF/NTNU/Norsun)*

15. **Simulation assisted design and manufacture of novel photovoltaic thermal (PVT) module** *Yijiang Xu, Paulius Laurikénas, Pål Tetlei, Martin Bellmann (SINTEF/Solitek)*

16. **Monitoring Growing Conditions in an Agrivoltaic System in Ås**
    *Eivind Venaas, Ingunn Burud, Espen Olsen (NMBU)*

17. **High-rate electron beam deposition of Si layers**
    *Marit Stange, Runar Dahl-Hansen, Tor Olav Sunde, Alexander Ulyashin (SINTEF)*

18. **Iron alloyed SnWO4 for tandem solar cell applications**
    *I. Bergsbak, V. S. Olsen, H. von Wenckstern, K. Bergum (UiO)*

19. **Effects of Partial Shading on Bifacial Half-Cell PV Modules: exploration through Photoluminescence Imaging and Performance Analysis**
    *Isabella Kværna Siemes (NMBU)*

20. **Managing Overvoltages in the Distribution Grid Caused by Solar Power Generation**
    *Jone Odden, Nils R. Ruud, Heidi S. Nygård (NMBU)*

21. **Depth resolved compositional analysis of CuZnO thin films** *Alexander Azarov, Eduard Monakhov (UiO)*

22. **Evaluation of the performance of bifacial PV system at Isfjord Radio compared to installations on mainland Norway** *Berhane Darsene Dimd, Gaute Stokkan, and Mari Juel (SINTEF Industry)*

23. **Optical, chemical characteristics of supportive Makrofol layer for solar panel under irradiation**
    *Reyhaneh Sadat Motevallian, Parviz Parvin, Seyedeh Zahra Mortazavi, Ali Reyhani, Amir Jafargholi, Nafiseh Sadat Kalantari, Mehdi Sohrabi, Mohammadreza Aghaei (Amirkabir University of Technology, Imam Khomeini International Universit, Ecole Polytechnique F´ed´erale de Lausanne, NTNU, INATECH)*

24. **Study of the performance of silicon solar cells coated with tungsten sulfide using radio frequency magnetron sputtering method**
    *Shiraqa Barakzay, Seyedeh Zahra Mortazavi, Ali Reyhani, Mohammadreza Aghaei (Faculty of Science, Imam Khomeini International University, Amirkabir University of Technology, NTNU)*

25. **Machine Learning Correction of Horizontal Irradiance for Solar Production Forecasting**
    *Martin Helge Johansen (UiA)*

26. **Enhancing Aerial Monitoring Strategies for PV Systems: A Novel Simulation Approach Utilizing Digital Twin Technology**
    *Mohammad Kolahi, Sayyed Majid Esmailifar, Amir Mohammad Moradi Sizkouhi, Mohammadreza Aghaei (University of Isfahan, Amirkabir University of Technology, Concordia University, NTNU, INATECH)*

27. **Detection and identification of growth anomalies of Czochralski grown silicon monocrystals by means of machine learning**
    *Frank Mosel, Dorra Baccar, Lukas Kulhavy (PVA Crystal Growing Systems GmbH1, Technische Hochschule Mittelhessen)*

# List of participants

| First name | Last name | Company |
|---|---|---|
| Alessandro | Nocente | SINTEF |
| Alexander | Azarov | UiO |
| Alexandre | Guyonnet | Sarl Metal Energie |
| Alfredo | Sanchez Garcia | SINTEF |
| Ana | Chagas | Solenergi FUSen |
| Andreas | Ranje | Hydro REIN |
| Andreas | Bentzen | T1 Energy |
| Anna | Bergman Risvoll | Grønt Hjerte |
| Arnkell | Petersen | NMBU |
| Arve | Holt | IFE |
| Bartlomiej | Gawel | The Quartz Corp |
| Basant | Raj Paudyal | Hafslund Vekst |
| Beint Even | Knutsen | Skarpnes |
| Benedikt | Kramm | PVA Crystal Growing Systems |
| Berhane Darsene | Dimd | SINTEF |
| Birgit | Hernes | The Research Council of Norway |
| Bjørn | Thorud | Aneo |
| Bjørn Johan | Ekren | Eidsiva Vekst |
| Bodil | Motzke | Oslobygg KF |
| Chang Chuan | You | IFE |
| Christian | Hadley | The Quartz Corp |
| Dag | Lindholm | IFE |
| Dounia | Dahlioui | UiA |
| Eirik | Bøckmann | Fred. Olsen 1848 |
| Eivind | Venaas | NMBU |
| Elin | Dypvik Sødahl | IFE |
| Erik | Marstein | IFE |
| Erik | Berge | MET |
| Erlend | Hustad Honningdalsnes | IFE |
| Espen | Olsen | NMBU |
| Frank | Mosel | PVA Crystal Growing Systems |
| Gabriela Kazimiera | Warden | NTNU |
| Gaute | Stokkan | SINTEF |
| Geir | Myrvågnes | NTNU |
| Gerhard | Venter | NMBU |
| Halvard | Haug | Scatec |
| Hanne Liland | Bottolfsen | Multiconsult Norge |
| HEIDI | NYGÅRD | NMBU |
| Heidi | Brevik | NEAS Energi Telekom |
| Heine Nygard | Riise | IFE |
| Helge | Malmbekk | IFE |
| Helge | Kristiansen | Conpart |
| Ingeborg | Høiaas | Oslobygg KF |
| Ingeborg Treu | røe | SINTEF |
| Ingvild | Bergsbak | UiO |
| Isabella | Siemes | NMBU |
| Ivar Loland | Råheim | NMBU |
| Iver | Frimannslund | NMBU |
| Jafar | Safarian | NTNU |
| Jarand | Hole | NVE |
| Jo | Gjessing | Scatec |
| Jonas | Låstad | NTNU |
| Jone | Odden | NMBU |

| First name | Last name | Company |
|---|---|---|
| Josefine Helene | Selj | IFE |
| Junjie | Zhu | IFE |
| Katinka Elisabeth | Grønli | UiO |
| Knut | Bråten | Hafslund Eco |
| Kristin | Bergum | IFE |
| Line | Nyegaard | Statkraft |
| Maegann | Raoult Guyonnet | Sarl Metal Energie |
| Magnus | Randers Thorsen | NMBU |
| Magnus Moe | Nygård | IFE |
| Mari | Øgaard | IFE/UiA |
| Mari | Juel | SINTEF |
| Marianne Waage | Fougner | Equinor |
| Marie | Syre Wiig | IFE |
| Marisa | Di Sabatino | NTNU |
| Marit | Ulset | IFE |
| Marit | Stange | SINTEF |
| Martin Helge | Johansen | UiA |
| Martine | Rønning | Statkraft |
| Matthew | Wright | University of Oxford |
| Mattia | Manni | NTNU |
| Merete | Estensen | IFE |
| Mette | Lie | ELHUB |
| Mette Kristine | Kanestrøm | Multiconsult |
| Mohammadreza | Aghaei | NTNU |
| Mulu Bayray | Kahsay | NTNU |
| Nagarajan | Somi Ganesan | SINTEF |
| Nicole | Aßmann | UiO |
| Nikolas | Recke | UiO |
| Per | Oterholm | Møre og Romsdal fylkeskommune |
| Per-Anders | Hansen | IFE |
| Rade | Ciric | UiA |
| Richard | Randle-Boggis | SINTEF |
| Roar | Kristoffersen | DSB |
| Rudie | Spooren | SINTEF |
| Rune | Strandberg | UiA |
| Rune | Søndenå | IFE |
| Samuel | Adaramola | NMBU |
| Sigbjørn | Grini | Norconsult Norge |
| Sigrid | Rønneberg | IFE |
| Snorre Braathen | Kjeldby | UiO |
| Solveig | Pettersen | NMBU |
| Stanislas | Merlet | Multiconsult |
| Tine Uberg | Nærland | IFE |
| Tinotenda | Mubaiwa | NTNU |
| Tone | Male Lien | Akershus Energi |
| Tore Sandnes | Vehus | UiA |
| Torfinn | Årdalsbakke | Eidsiva Vekst |
| Torje | Evensen | Multiconsult |
| Torunn | Kjeldstad | IFE |
| Trine Kopstad | Berentsen | Fornybar Norge - Solenergi |
| Trond | Ahlquist | Solgrid |
| Turid | Reenaas | NTNU |
| Vebjørn | Bakken | UiO |
| Vilde Stueland | Nysted | IFE |
| Wolfgang | Kampel | Multiconsult Norge |
| Yijiang | Xu | SINTEF |

On behalf of FME SOLAR

# Welcome back to next year's conference!

FME SOLAR