

## The University of Oslo becomes a member of SFFE

The University of Oslo (UiO), Department of Mathematics and Physics, has recently decided to join the Centre for Renewable Energy (SFFE). SFFE was formed by SINTEF and NTNU in 2004, and in 2005 Institute for Energy Technology joined in as an equivalent partner. "We are deeply happy that UiO now has become a part of SFFE", says chairman of the board in SFFE, Petter Støa from SINTEF Energy. He also emphasizes that he wants SFFE to be a national gateway to research on renewable energy, and an arena for common development for strategic interests and projects. The inclusion of UiO in the centre is hence an important step to fulfill this. The University in Oslo are doing research on several areas within technology for renewable energy as solar cells, thermal solar energy, hydrogen and batteries. Faculty director Anders Elverhøi will join the board of SFFE and Head of Institute Svein Stølen becomes a member of the leader group. SFFE bids welcome to the new members and are certain that this is positive news for the research on renewable energy.



## IFE is charging the batteries

The electrical car Nissan Leaf was in 2011 awarded the title 'car of the year', as the first electrical car ever. The importance of batteries in the transport sector has long been evident for Institute for Energy Technology (IFE), and researcher Preben Vie (posing with a lithium cell) is now building up a battery lab that is growing steadily. Several battery runners are constantly charging and tapping the batteries for power, testing the lifetime and durability of the batteries. Battery chemistry is also an important research area for IFE, with heavy focus on lighter and cheaper batteries. Lithium is a central metal in this research, but nickel metal hydrides batteries is also a prioritized area as IFE is hoping to implement their long traditions in the research on hydrogen storage in metal hydrides.



(Photo: Christer Heen Skotland)

## SINTEF-technology blossoms in Singapore

Metalkraft's new factory will be built in connection with REC's new fabric for solar cell production, that will produce an equivalent of 10 percent of the world's total production in 2009, or 800 MW. Metalkraft will recycle waste from the wafer production at REC. The cutting of silicon blocks to wafers causes a lot of cutting slurry consisting of glycol, silicon carbide and silicon, and big values will get lost if this is not recycled. The recycling technology is developed by SINTEF and later commercialized by Metalkraft.

### SFFE is working with:

- ✓ **Influence:** The Centre participates in the public debate on renewable energy research and innovation and the framework conditions in Norway.
- ✓ **Networking and coordination:** The Centre is a platform for national and international cooperation, and coordinates the competence within renewable energy at the three research institutions NTNU, SINTEF and IFE.
- ✓ **Dissemination and information:** The Centre is an information resource on renewable energy research in Norway, and works to increase the common knowledge on the subject.
- ✓ **Recruitment:** The Centre works to strengthen the educational facilities on renewable energy in Norway, and to recruit young people to renewable energy research and industry.

## The SFFE-researcher of Decembre is burning wood

Edvard Karlsvik has worked in SINTEF for the last 33 years and has been involved in basically all projects within SINTEF that is including wood firing, a method for creating heat familiar to most Norwegians. New technology in the mid 90s made it possible to increase the efficiency from 40 to 80 percent, at the same time as particle emissions sunk with more than 75 percent. Ever since, new regulations for the insulation thickness and loss of heat in buildings has reduced the need for ovens with high power output, and especially as low energy buildings are entering the market. SINTEF and the wood-oven producer Dovre, are now cooperating with a project that is focusing on ovens for low power output and increased burning period. A very important aspect is the user-friendliness, and the goal is to produce an oven that only has to be fed every fourth hour. High efficiency is important in order to not release too much particles when using the ovens in low energy buildings.



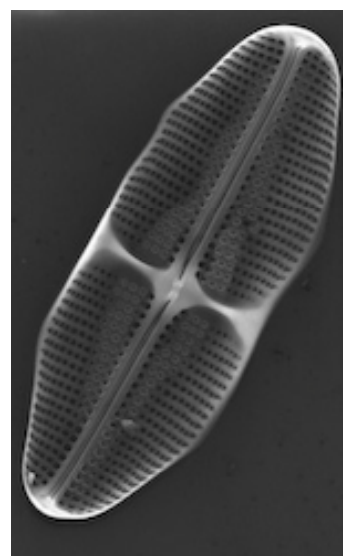
(Photo: Thor Nilsen)

## NTNU and SINTEF is strengthening the corporation with China

NTNU, SINTEF and the Norwegian company Predictor has signed a cooperation-agreement with the Chinese solar producer Solarfun and Shanghai Jiao Tong University. The agreement consist of student exchange and technological corporation with solar cell production. The cooperation is supported by The Norwegian Research Council through the CHINOR-program. China and Taiwan produce all together 50 percent of the worlds solar cells, and much of this is with old production methods for silicon with a much higher energy consumption. China is exporting 95 percent of their production, but this share will probably shrink in the coming years. The installation of solar cells in China only counts for 300 MW, but at the stairs there are projects for a total of 12 000 MW, which is 1000 MW more than what was installed globally in 2009.

## NTNU and SINTEF produces solar cells from algae

Is it possible to make solar cells from algae? Almost, and that is the goal of 'SOLBIOPTA', a multi-disciplinary project with optic engineers, biologists and material scientists at NTNU and SINTEF. The diatom algae has a shell of silicon oxide with a special structure specially designed to capture the sunrays. The shell is perforated with small holes (see picture) that will let the sunrays in but not out of the shells, and this structure is impossible to create synthetically. The objective is to incorporate the shells as a layer in the solar cell as an anti-reflective layer. One of the biggest challenges with solar cells is actually to capture the sunlight, or in other words, to prevent the sunrays to reflect from the surface before creating electricity. So far there has been very little research on this, but experience from Oregon State University from USA show that diatom algae could tipple the efficiency of Dye-sensitized solar cells, that traditionally has an efficiency at around 10 percent. The project has just kicked off, but the hope is to produce a solar algae cell within three years.



(Photo: Anne Kirsti Noren/NTNU)

## The SFFE-researcher of January is removing impurities

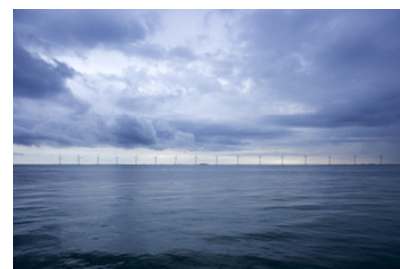
Clean silicon is important in order to create solar cells with high efficiency. Traditionally this has been solved by removing the impurities in silicon using the Siemens process, an extremely energy intensive process. Although the impurities can also be removed by looking at the raw materials for silicon production, carbon and quartz. The doctoral thesis of Elena Dal Martello (who at the picture is studying the impurities in a stone of quartz) has the topic 'Study of the impurities behavior from raw material to poly-silicon', where she is analyzing the impurities in the production process from raw materials to clean solar grade silicon. The supply of raw materials to the productions is not a limit, as 1/3 of the earth's crust consists of quartz, but the clue is to use quartz with a relatively small amount of impurities. Elena is studying how to crush the quartz and to remove the impurities with sieving or electric fragmentation. The effect of supplying the raw material in pellets or lumpy charges in the furnace is also a part of her thesis, as this might alter the behavior of the impurities.



(Photo: Christer Heen Skotland)

## Offshore wind conference in Trondheim

Almost 200 people participated at the offshore wind conference arranged by the FME-centres NOWITECH and NORCOWE at the 20-21 of January. The latest research within offshore wind energy from Norway and Europe was served at the conference. Offshore wind energy has experienced a historic progress with a 51 percent 2010-growth in Europe, and more than 1100 offshore windmills are now spinning in shallow European waters. The conference is arranged annually, and will be arranged at the same time and the same place in 2012.



## Some Conferences and seminars

<a href="#">Solar Power Europe</a> , UK	16-17.02 2011
<a href="#">Heat Pumps in low energy buildings</a> , Gardermoen	23-23.02 2011
<a href="#">EWEA 2011</a> , Belgium	14-17.03 2011

## SFFE's leading group

<a href="#">Gabiella Tranell</a> (manager), NTNU	<a href="#">Ånund Killingtveit</a> , NTNU	<a href="#">Lars Sørum</a> , SINTEF
<a href="#">Ann Mari Svensson</a> , SINTEF	<a href="#">Marianne Ryghaug</a> , NTNU	<a href="#">John Olav Tande</a> , SINTEF
<a href="#">Kari Aamodt Espegren</a> , IFE	<a href="#">Turid Worren Reenaas</a> , NTNU	<a href="#">Matthias Haase</a> , SINTEF
<a href="#">Erik Stensrud Marstein</a> , IFE	<a href="#">Svein Stølen</a> , UiO	