The first part of 2017 is over, busy months with lot of activities for the members of the SFI Metal Production. Several Workshops, conferences and project meetings with participants from research and industry have been arranged - covering the wide span of the SFI. Some examples are PAH formation and emissions, CFD modelling, Summer school on Silicon at Iceland and the Spring Meeting. The SFI members have also been presenting their work at Conferences like TMS and SINTEFs Circular Economy conference in Mo. Several exchange students have been visiting the SFI premises. A description of the activities are given later in this Newsletter.

Long Term Plans for SFI Metal Production has been made, and was approved by the Executive Committee in June. The Long Term Plan will be presented for approval of the General Assembly in November. The process making the plan started early in 2017, and have been carried out in close cooperation with the industry partners. The Long Term Plan will be a guide for the annual work plans.

The SFI team will like to thank all partners in the SFI for an interesting and productive winter and spring. We are looking forward to meet you all after the summer holiday.

Have a nice summer holiday!
Si Summer school, Iceland 13-15 June

The 4th Si summer school was arranged by Gabriella Tranell and Merete Tangstad at NTNU together with Gudrun Sævarsdottir at Reykjavik University in Reykjavik, Iceland 13-15 June.

The school had a record attendance of 63 people from around Europe, South Africa, USA and South America. The school had lecturers from both NTNU/SINTEF and Iceland, with an invited lecture from Javier Bullon, retired CTO of Ferro Atlantica/Ferro Globe.

The program covered both Si production, raw materials, refining, casting and environmental/OHS issues. We were also fortunate enough to get a guided tour of the new United Silicon plant near Keflavik.

See you all in Norway 2019!

Visit:
Hydro Al Recycling, Dormagen

The annual excursion for the 3rd year material students at NTNU this year went to Germany. As part of the tour, we visited Hydro’s Al recycling plant in Dormagen, on the 4th of April.

We were very well received and the students were impressed by the size of operation and the rate of automatic metal sorting. After a nice German style lunch, we travelled on to the wineries in Bad Durckheim outside Mannheim.

Thank you Hydro for your hospitality!

SAM 11

The 11th meeting of the Society and Materials conference, SAM-11, took place in Norway, at Trondheim’s NTNU on 15 and 16 May, 2017. 5 keynote lectures, 25 presentations and 10 posters were presented to an audience of 77 participants from 3 continents and 15 countries. The academia/RTO/industry distribution was 65-17-18%, while the gender ratio was 43/57%, males/females.

In the introductory, the pioneering and seminal role of NTNU in the fields of metals, society and societal metrics (MFA in particular) was emphasized.

Then the chair of the scientific committee stressed the point that the conference was to bring together material “hard” sciences and social “soft” sciences. Moreover, the conference serves as an experimental laboratory, where new ideas are tested and discussed in terms of methodology but also of implementing them to solve strategic societal challenges: “if it is not new or disrupting, don’t bring it to a SAM conference!! If it does not connect both material and social dimensions, do not propose it either!”

SAM-12 is planned May 22nd to 24th 2018 in Metz in France.

Read more about the conference at: www.sovamat.org/
Conference on Circular Economy

It was arranged the 10th-11th of May 2017 in Mo in Rana, Norway. The conference gave participants insight in how to succeed in business within the framework of circular economy, and how research and innovation can contribute! The conference provided with background details to understand circular economy, and facilitate learning and experience transfer across sectors through examples of business and research as well as facilitated discussions. Successful leaders within their fields, contributed with experiences and recommendations in how to succeed. In addition, important Norwegian governmental actors describe how they could assist companies in realising their projects.

12th International Conference on CFD

SINTEF and NTNU hosted the 12th International Conference on CFD (Computational Fluid Dynamics) in the Oil & Gas, Metallurgical and Process Industries in Trondheim May 30th to June 1st. The conference was sponsored by SFI Metal Production. More than 100 studies were presented and roughly 20 papers on metallurgical applications (tapping, casting, reactors and more). The 80 participants attended the conference showed a high interest of the topics. The conference is organized in cooperation with CSIRO.

PAH Meeting

RD4 arranged a workshop 21st of April on the status and way forward on research in the area of PAH emissions. The workshop was attended by industry representatives from both Elkem, Wacker, Eramet, GE and Hydro, in addition to NTNU and SINTEF. On-going industrial campaigns in the Si and Al industries will continue in the fall. Industry representatives are interested in strengthening the SFI research through a parallel IPN application to the RCN.

Industrial Secondary Flows

A specialist meeting was arranged regarding Industrial Secondary Flows. The meeting was held at March 30th 2017 at Hotel Scandic Ler-kendal, Trondheim. It was arranged together with the innovation project Waste-2-Value and representatives from the industry, the EYDE-network, Glencore Nikkelverk and ReSiTec, in addition to the representatives from SFI Metal Production.
Spring Meeting 25th-26th of April 2017

Climate change and its relation to emissions, including those from the process industry, was the background for the first session. Øyvind Slaåke/Norsk Industri presented the ongoing processes based on the Norwegian Industries’ Roadmap - Combining Growth and Zero Emissions by 2050, the Report from the Government’s expert committee for Green competitiveness and the Report to the Norwegian Parliament, Industry – Greener, smarter and more innovative. Focus on R&D, access to renewable energy on competitive conditions were highlighted, Process21 is an important process for the SFI members. Eli Ringdalen followed up with a presentation of the "Road-map for gas in the Norwegian metallurgical industry: greater value creation and fewer emissions". The vision for the road map is a sustainable metallurgical industry that will attain CO2-neutrality by 2050. Expanding the use of gas will contribute to make this vision a reality.

The first thematic topic – Waste /Anne Kvithyld. Prof. Markus A. Reuter's presentation "Digitalizing the Circular Economy", focused on Fairphone2 as an example for Design for Recycling. What is the best recycling scenario out of three alternatives? A dismantling process was the best option showing that the choice of process is important. Anne Kvithyld presented the report "Waste and by-product overview of the metallurgical industry in Norway", with a special focus on the SFI partners. It is an important report that will form the basis for the selection process for coming activities on waste. Anders Sorhus/GE presented the process/equipment developed by GE together with the AI-industry with the title "Alumina as collector of impurities from the Al electrolysis cell". Sean Kelly was the last speaker with recycling of Al with focus on automotive scrap flows.

The second thematic topic - "Modeling by use of FactSage". Post Doc Elmira Moosavi Khonsavi presented "FACTsage thermodynamic modelling; background and selected applications in SFI". Thermodynamic is very important to the work in the SFI. This was well demonstrated by some examples; removal of P from metal, Dusting and fuming from FeMn production, and Al-electrolysis. Kai Tang followed up with examples of modelling of slag properties from thermodynamic data (Slag- Struc), and the last presentation from Asbjørn Solheim on thermodynamics in Al electrolysis.

Sverre Gulbrandsen-Dahl/SINTEF Raufoss, and Centre Manager SFI Manufacturing - “Ups and downs, The nature of Science”. The relation between the challenges in the Norwegian productivity that is declining and the results in NCE and SINTEF Raufoss that has shown an increased productivity: 46 per cent vs 18 % in Norwegian Industry in general (excl. oil and gas). The SFI Manufacturing has high ambitions when it comes to Spin-Off projects reflecting the situation at Raufoss.

The third thematic topic "My projects in 5 minutes" with the PhDs and Post Docs in SFI Metal Production. Thank you to all the students, Post Docs and Marie for excellent presentations – all on time and to the point. A Poster session with the PhD and Post Docs, followed thereafter in the coffee area with time for further discussions.

Prof. Margaret Hyland took the challenge and stepped in for Anne Kjersti Fahlvik with the presentation "Innovations, research and industry – a powerful combination" with examples from New Zealand, combining culture and science projects. Thank you for your contribution!

The last thematic topic was Particle technology with Gabriella Tranell. Ida Kero started with results from FUME project on dust formation in the ferroalloys industry. Heiko Gaertner followed with a state of the art on PAH in the metals industry. Both topics are very important for the SFI.

All the presentations are available on the SFI eRoom - My eRooms > SFI Metal Production > Administration > Meetings > 2017 > SFI Spring Meeting April 2017
A mineral with the pseudobrookite structure is Armalcolite, named after the crew of the Apollo 11 moon landing (Neil A. Armstrong, Edwin E. Aldrin and Michael Collins) because it is found in appreciable amounts on the moon. Armalcolite has the ideal formula \( \text{Fe}_0.5\text{Mg}_0.5\text{Ti}_2\text{O}_5 \) limited by the following compounds: \( \text{MgTi}_2\text{O}_5 \), \( \text{Fe-Ti}_2\text{O}_5 \), \( \text{FeMg}_0.5\text{Ti}_1.5\text{O}_5 \) and \( \text{Mg}_0.5\text{Ti}_2.5\text{O}_5 \).

During excavation of a Silicon furnace it was seen that the 2-3 cm’s of the electrode was totally transformed to SiC.

Pre-treatment of bauxite with hydrogen at 350 °C made the bauxite and its leached residue magnetically susceptible.

Methods and procedure for running SiMn pilot experiments have been further developed to allow comparison of results from different experimental series. The experiments are run for 8 hours at around 180 kW and produces around 250 kg metal. Good results with up to 20 % Si requires stricter control of raw material analysis and electrode position than in industrial operation.

Metals from the incinerator is worse than lacquered material in the respect that it do not coagulate.

The aluminium oxide strength are affected by high levels of Be.

**SCIENCE FACTS**

Some of the results for the various the Reasearch Domain in the SFI are presented in the issue of the SFI Newsletter on page 4 and 5. Hope you will enjoy the latest news from the research from the SFI.

**Science Facts RD2**

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**Science Facts RD3**

Metals from the incinerator is worse than lacquered material in the respect that it do not coagulate.
Metal Production is an interdisciplinary Centre for Research-based Innovation (SFI). During the next decades, the Norwegian metal industry will need to achieve even higher-quality output with more efficient use of resources and energy.

The main goal of the Metal Production is to enable industrial innovation and give the industry long-term access to world-class fundamental competence and candidates. This will enable the industry to maintain its position at the forefront of sustainable innovation.

**Upcoming Events**

**2017**

**August 29th - 30th**  
HSC Chemistry Course  
Trondheim, Norway

**September**  
EIT Raw materials—Stakeholders Meeting & National Brokerage Event EU Projects  
Trondheim, Norway

**September 22nd**  
Executive Committee Meeting  
Trondheim, Norway

**October 11th - 12th**  
Tapping Seminar  
Trondheim, Norway

**October**  
Industri 4.0/Big Data og IPR  
Norway

**November 7th - 9th**  
SFI Metal Production Autumn Meeting  
Trondheim, Norway

**November 28th - 29th**  
Recycling Seminar  
Trondheim, Norway

*Dates to be announced. Follow our webpages for updates.*

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