

Strategic research initiative:



Functional OXides through HOlistic UNDerstanding



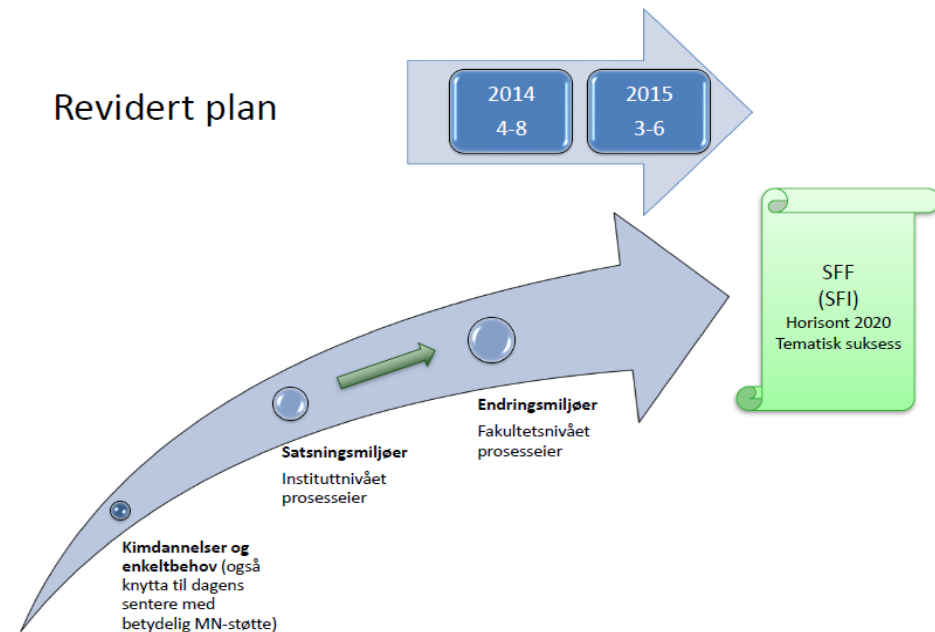
“A foxhound is a type of large hunting hound bred for strong hunting instincts, great energy, and, like all scent hounds, a keen sense of smell ... hunts in packs ...”

(Wikipedia)

Strategic research Initiative: a strategic effort to establish new internationally competitive research environments

9 strategic research initiatives started in 2014:

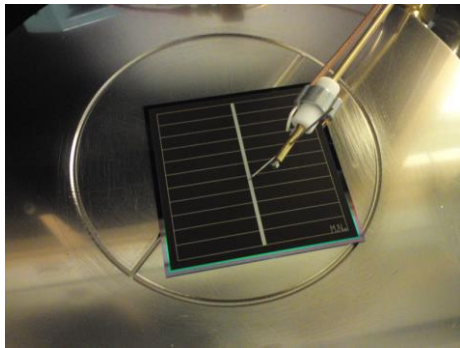
- Centre for Integrative Neuroplasticity
- **Functional oxides through holistic understanding (FOXHOUND)**
- Space technology, experiment, theory and plasma turbulence
- Centre for integrative microbial evolution
- Centre for Computational Inference in Evolutionary Life Sciences
- Molecular Imaging of cellular stress
- Sikkerhet og robusthet for nettbaserte systemer
- Breaking barriers in medical diagnostics; emerging Technologies
- Designmetoder for komplekse arkitekturer



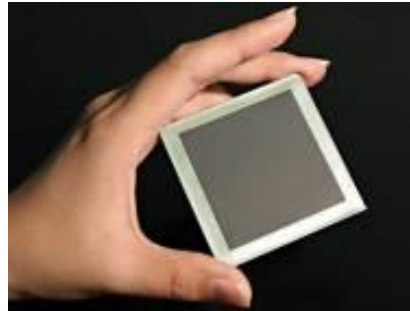


Functional oxides for energy applications

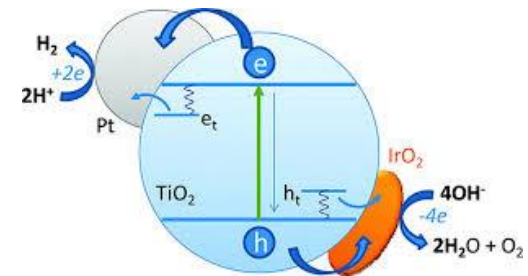
Solar cells



Solid oxide fuel cell



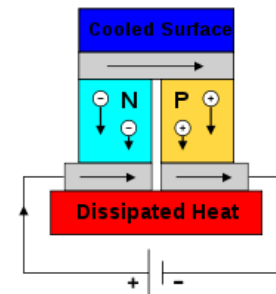
Photocatalysis



Battery technology



Thermoelectricity



Functional oxides for energy applications

Semiconductor Physics Division

~40 people

- Nanotechnology
- Oxide semiconductors
- Defects and diffusion
- Photovoltaics

FASE

~30 people

- Defect chemistry
- Proton conduction
- Fuel cells and membranes

Catalysis

~30 people

- Catalyst synthesis
- Innovative natural gas processes and products

NAFUMA

~50 people

- Novel compounds
- Atomic Layer Deposition
- Monodispersible nanoparticles

Structural Physics Division

~30 people

- Thermoelectric materials
- Transmission Electron Microscopy
- DFT modeling

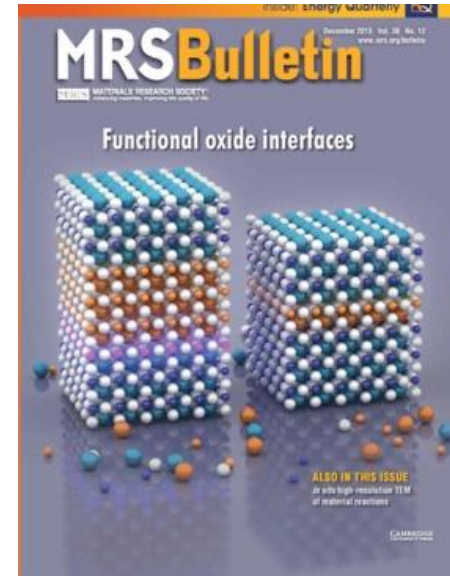
FI

KI

FOXHOUND

Functional OXides through HOlistic UNDerstanding

*A cross-disiplinary approach to Energy
Conversion by Functional Oxides*



In a nutshell:

- 5 research groups at Dep. of **Physics** and **Chemistry**
- 6-8 PhD students, 18 staff members
- Driven by the **younger** researchers in each group
- Act as a **platform** for future projects and collaboration
- A tool for further development of SMN as a top-tier research center within Materials research
- Utilize «unique» facility
- Coordination of DFT modeling between the groups
- Integration of strategies suggested in e.g. Fysikkevalueringen and «KI fagstrategi»

Research Infrastructure

NorFab

(Norwegian micro- and nanofabrication facility)



NORTEM

(Norwegian Center for Transmission Electron Microscopy)



RECX

(Norwegian Centre for X-ray Diffraction, Scattering and Imaging REsource Centre X-rays)

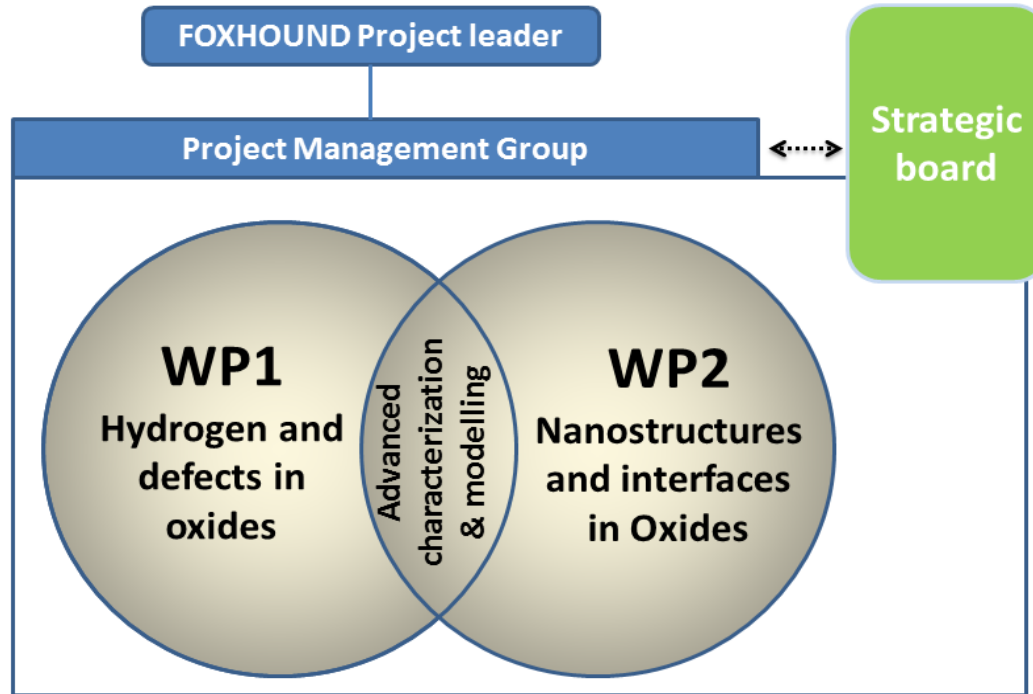


FASE (solid state electrochemistry)

- Measurements under controlled atmospheres, enabling, e.g. to separate proton transport numbers from those of other ions



Organization



5 groups at Physics/Chemistry involved

- 18 permanent staff members

Project management group consist of one “younger” researcher from each group

- Lasse Vines (LENS)
- Reidar Haugrud (FASE)
- Stian Svelle (Katalyse)
- Øystein Prytz (Strukturfysikk)
- Anja Olafsen Sjøstad (NAFUMA)

PhD students

2014: 4 (2FI + 2KI)

2015: 2 (1FI + 1 KI)

(2016: 2 (1FI + 1KI)?

Strategic board

- Experienced researchers at SMN (SMN ledergruppe)

Research Topics: Functional Oxides

WP1. Hydrogen and defects in oxides

- Semiconducting metal-oxides (SMO) taking Ruddlesden-Popper type structures
- Novel mixed hydride oxides (potentially also including nitride)
- Structure, the defect chemistry, thermal stability and transport properties

WP2. Properties of nanostructures and interfaces in oxides

- Interface properties in oxide-oxide heterostructures and metal-oxide junctions
- Model structures of TiO_2 , ZnO , Cu_2O
- Structure-composition-function relationships
 - Spatial effects on the local band gap, Space Charge, Strain
- *Supported by DFT modeling and advanced characterization*

