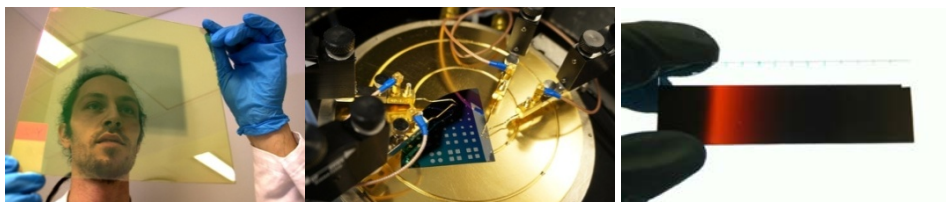




## Summer job opportunity and Master thesis suggestion

Relevant for: Physics/Chemistry/Materials science/Nanotechnology

### Deposition and characterization of thin films of metal hydrides and oxides for energy-saving smart windows



About 40% of the world's energy consumption goes to buildings for heating, cooling, and lightning. To decrease the energy consumption is an important challenge. Smart windows have the potential to solve the challenge. Chromogenic (photochromic, thermochromic, gasochromic, and electrochromic) materials reacting to external means such as illumination, temperature variations, electric field and some gases are of interest for smart window applications. In this list electrochromic materials have received increased attention because they are already used in energy-efficient windows, automotive rear-view mirrors, sunroofs, displays, and hydrogen sensors.

The idea of this project is related to experimental study of metal hydride and oxide films for smart window applications. The work which we are planning, consist of development of thin films for use in smart windows. The subject is suitable for one student, or two students may work with different aspects of the same problem. If time allows, the students can fabricate prototype electrochromic device. The experimental techniques to be used in the work is magnetron sputtering, X-ray-diffraction (XRD), atomic force microscope (AFM), scanning electron microscope (SEM), neutron reflectometry (NR), optical ellipsometry, UV and visible spectrophotometer, and setups needed for hydrogenation of thin films. No prior knowledge of these techniques is necessary.

By participating in this project the student will take part in building up a new research field to Norway; Smart windows based on electrochromism and photochromism. The research is related to the research of IFE on metal hydrides for solar cells and smart windows. The work will be carried out together with our international research partners, and the student can expect some trips to Uppsala, Delft, Grenoble and/or Amiens in France.

Our Institute is located in ~15 km from centre of Oslo. Our laboratory is relatively new with new equipment and offices. We welcome every year students from the Universities and University Colleges of Norway.

- Forsking.no: [Nytt stoff i solcellene](#)
- Forskning.no: [Formørknings-mysteriet](#)

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