



Helsinki University of Technology, Finland

New Energy Technologies

Group introduction

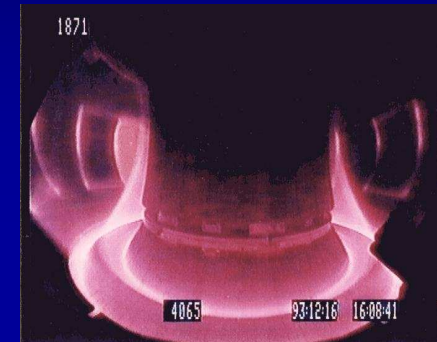
Minna Toivola, M.Sc.

Nanotech Europe 2009, Berlin, Germany
Business breakfast and matchmaking Oct 1, 2009



General

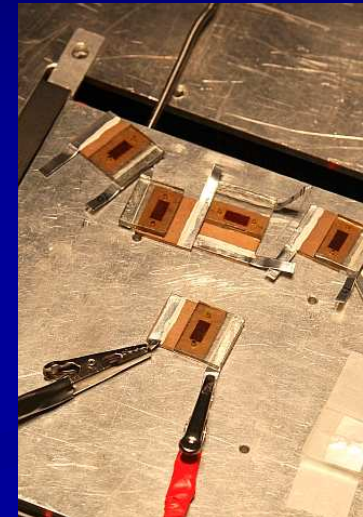
- Part of Department of Applied Physics
(in Faculty of Information and Natural Sciences)
- Energy-related research on
 - Fusion and fission power
 - New and renewable energy
 - Photovoltaics
 - Fuel cells and hydrogen
 - Wind power
 - Distributed energy generation
- Background in nuclear energy engineering; renewables research started in the beginning of the 80's





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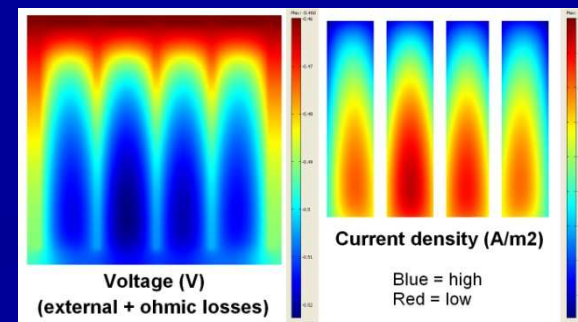
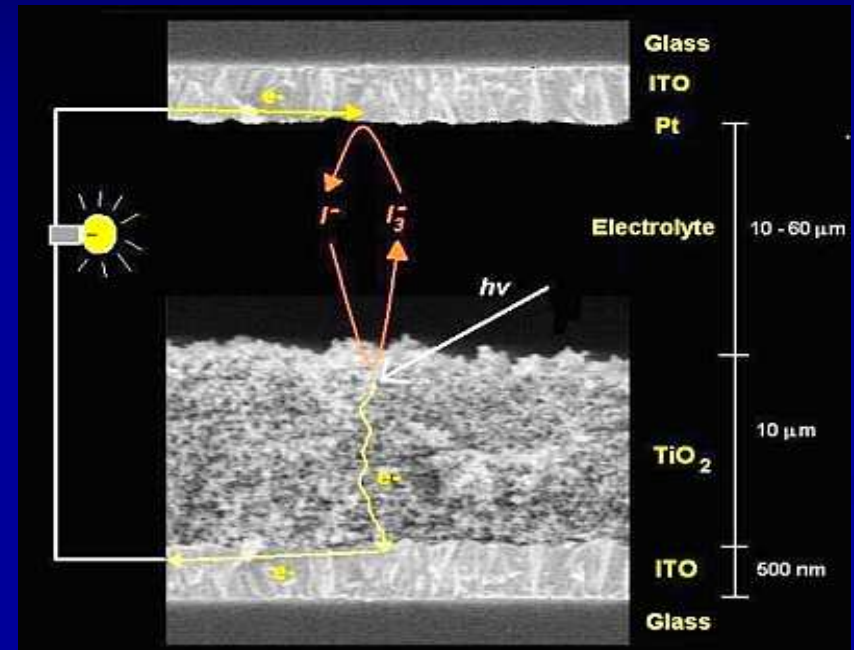
- Led by Prof. Peter Lund
- 2 post-docs, 7 doctoral students, varying number of undergrads and foreign visitors (China, Japan, Pakistan, USA, France, Spain, Sweden, etc etc...)
- Ca. 10 peer-reviewed publications/year
- Equipment includes e.g. solar simulator, EIS measurement units, spectral response measurement unit, UV-VIS and FTIR spectrometers, climate chambers for accelerated aging tests, fuel cell measurement stations, hydraulic press, thermomechanical stress measurement unit, thermogravimeter, profilometer, optical microscopes, SEM, TEM (sub-Å)...
- Funding: Academy of Finland, The Finnish Funding Agency for Technology and Innovation (TEKES), other foundations, companies, EU...





Photovoltaics

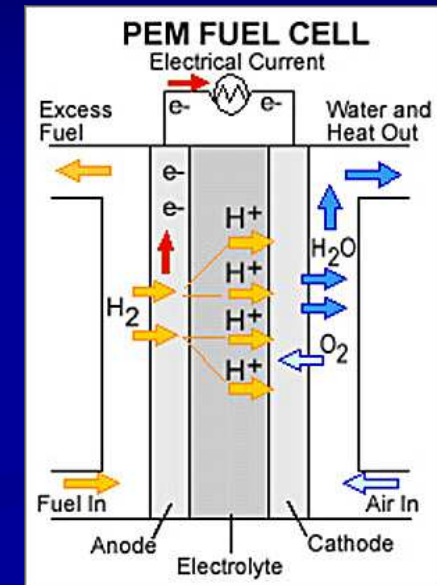
- Main focus on nanostructured dye-sensitized solar cells (DSC)
 - Flexible cell suitable for roll-to-roll production
 - Performance characterization
 - Integration of the DSC on metal sheets
 - Cell lifetime issues
 - Cell size upscaling
 - Mathematical modeling
 - Improving the cell efficiency and cost savings by integrating carbon nanomaterials into the cell structures
- World class efficiencies with DSC directly integrated on stainless steel sheet



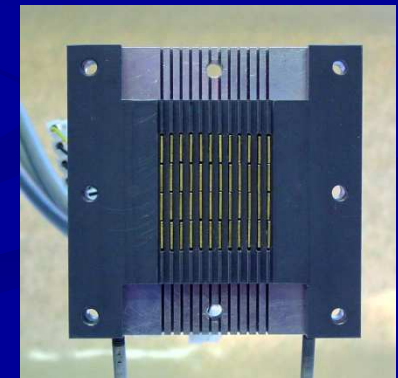
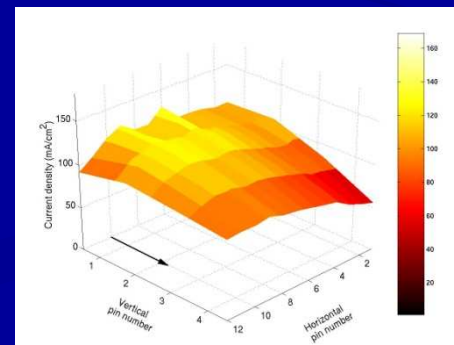


Fuel cells and hydrogen

- Main focus on polymer electrolyte membrane fuel cells (PEM-FC)
 - Material and performance characterization
 - Mathematical modeling
 - Mechanical design
 - Small fuel cell systems
 - Degradation and lifetime issues
 - Mass transport issues
 - Free breathing PEM-FC (world record power density)
- Also SOFC and IT-SOFC research with partners (VTT)
 - Mathematical modeling
 - SOFC test unit (Wärtsilä)

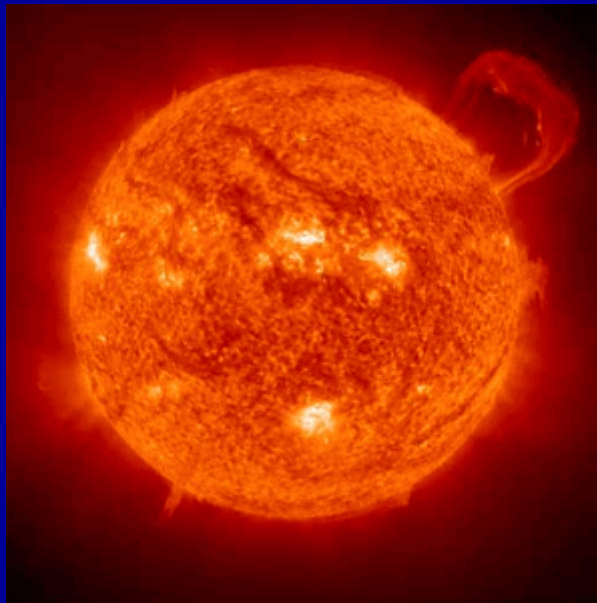


<http://alternativefuels.about.com/od/researchdevelopment/ig/Fuel-Cell-Diagrams/PEM-Fuel-Cell.htm>





Thank you for your attention!



For more information email minna.toivola@tkk.fi