nano-tera.ch
swiss scientific initiative in health / security / environment systems

SHINE RTD 2013

FNSNF

Electrocatalysts for hydrogen production

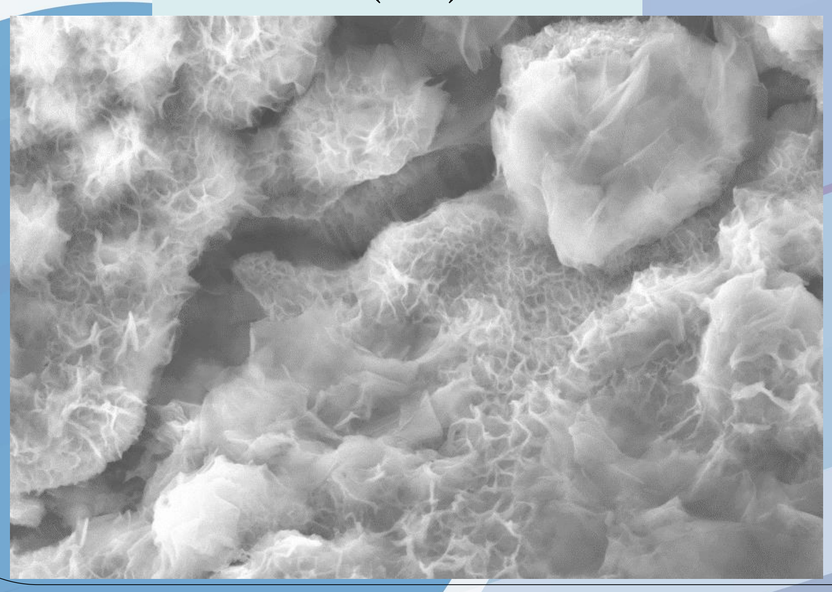
D. Bora[1], F. Boudoire[1,2], A. Braun[1], E.C. Constable[2], G. Fortunato[3], M. Grätzel[4]
C. E. Housecroft[2], Y. Hu[1,4], M. Mayer[4], N. S. Murray[2], R. Toth[1], R. M. Walliser[2]

[1]*Laboratory for High Performance Ceramics, EMPA, Dübendorf, Switzerland*
[2]*Department of Chemistry, University of Basel, Basel, Switzerland*
[3]*Protection and Physiology, Empa, St. Gallen, Switzerland*
[4]*Laboratory for Photonics & Interfaces, EPFL, Lausanne, Switzerland*

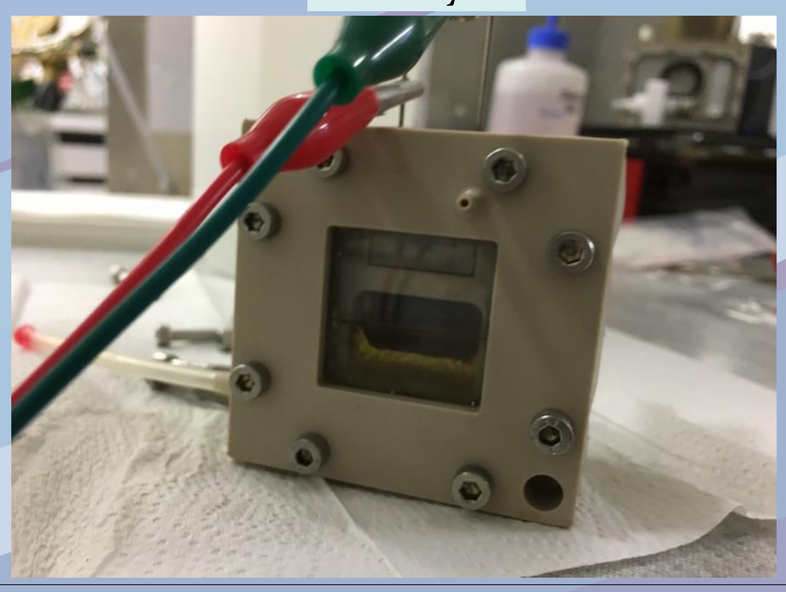
- Electrocatalysts facilitate redox reactions
- Oxygen evolution, hydrogen evolution and oxygen reduction reactions are relevant for renewable hydrogen economy
- *Design of active materials important aspect of electrocatalysis*
- Integrity and stability of electrocatalysts is a relevant issue
- We present materials and molecular based electrocatalysts

Ni - Electrocatalysts Functionalized Membrane Electrode Assembly (MEA)

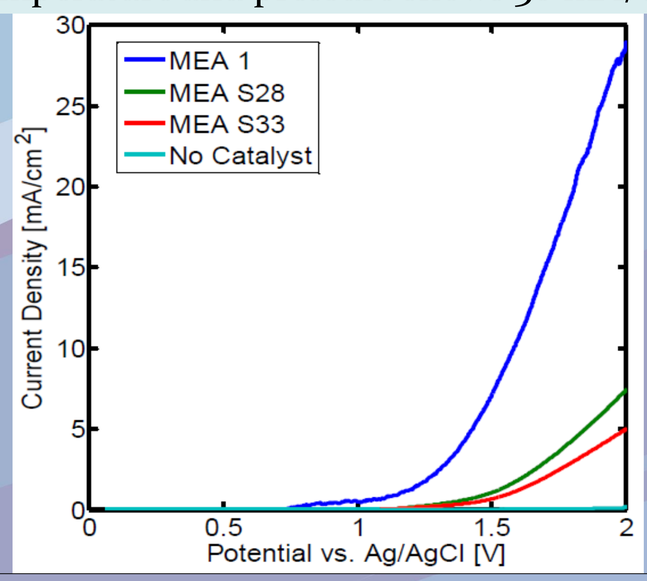
Morphology **of MEA** with **Ni(OH)2**



Electrolyzer

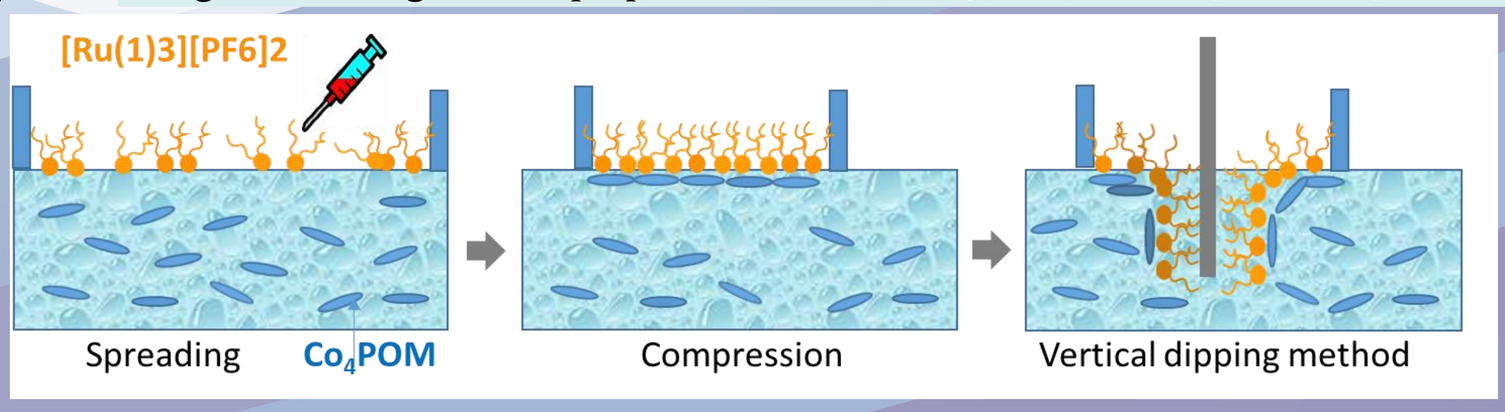


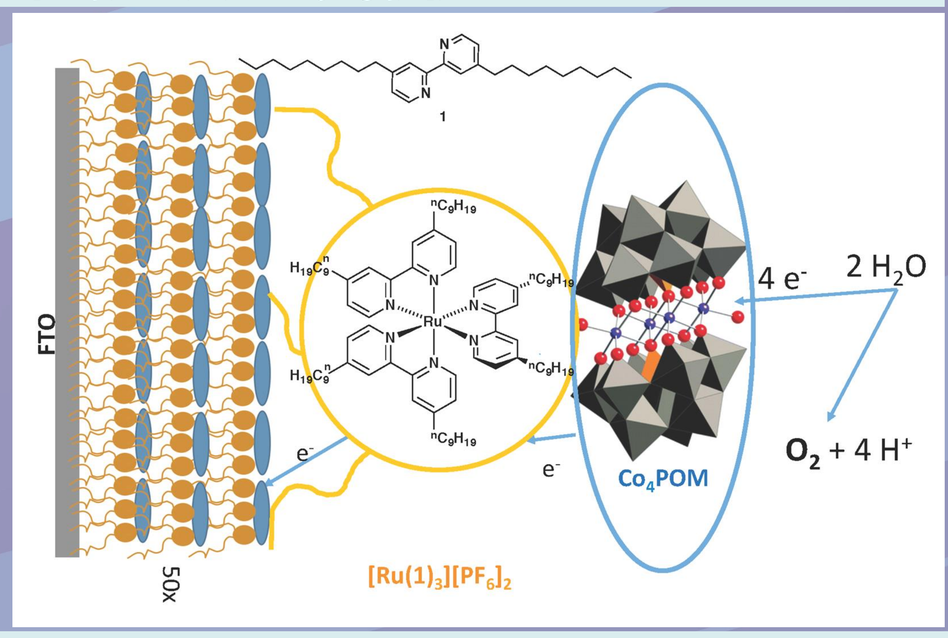
MEA with optimized warm press temperature and pressure shows 30 mA/cm²



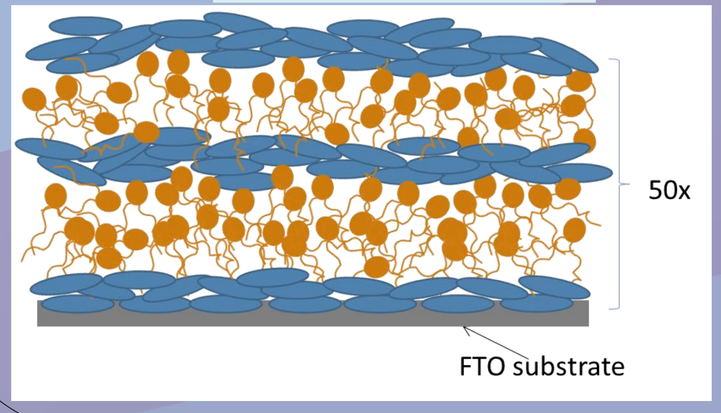
Self-assembled water oxidation device

Langmuir-Blodgett film preparation from [Ru(1)3][PF6]2 and Co4POM (Co4POM = K10[Co4(H2O)2(α-PW9O34)2])

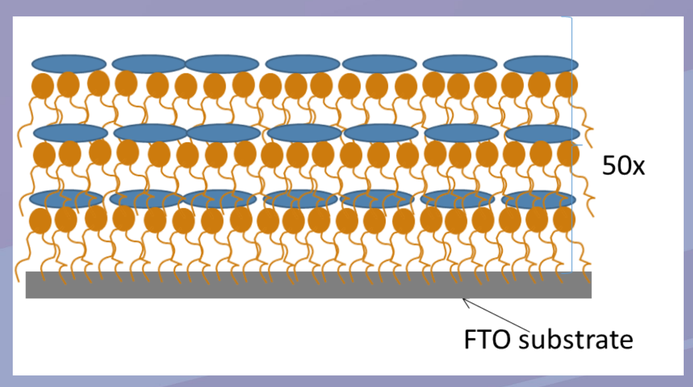




Drop cast (DC) film



Langmuir-Blodgett (LB) film



- DC films evolve more O_2 per geometrical area than LB films
- Catalyst is stable on the FTO surface for about 500–600 mins
- XRD –interaction between CoPOM & [Ru(1)3][PF6]2
  Chem. Commun., 2016, **52**, 2940

X-ray spectroscopic and electroanalytical investigations