



ELECTRA  
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Grant Agreement No.: 621244



## ELECTRA

### High Temperature Electrolyser with Novel Proton Ceramic Tubular Modules of Superior Efficiency, Robustness and Lifetime Economy

#### List of Beneficiaries

No.	Organisation name	Country
1 coordinator	University of Oslo	Norway
2	Inst. Chem. Technology, University P. Valencia	Spain
3	Stiftelsen SINTEF	Norway
4	MARION Technologies	France
5	CoorsTek Membrane Sciences AS	Norway
6	Abengoa Hidrógeno SA	Spain
7	Carbon Recycling International	Iceland



UiO : Universitetet i Oslo



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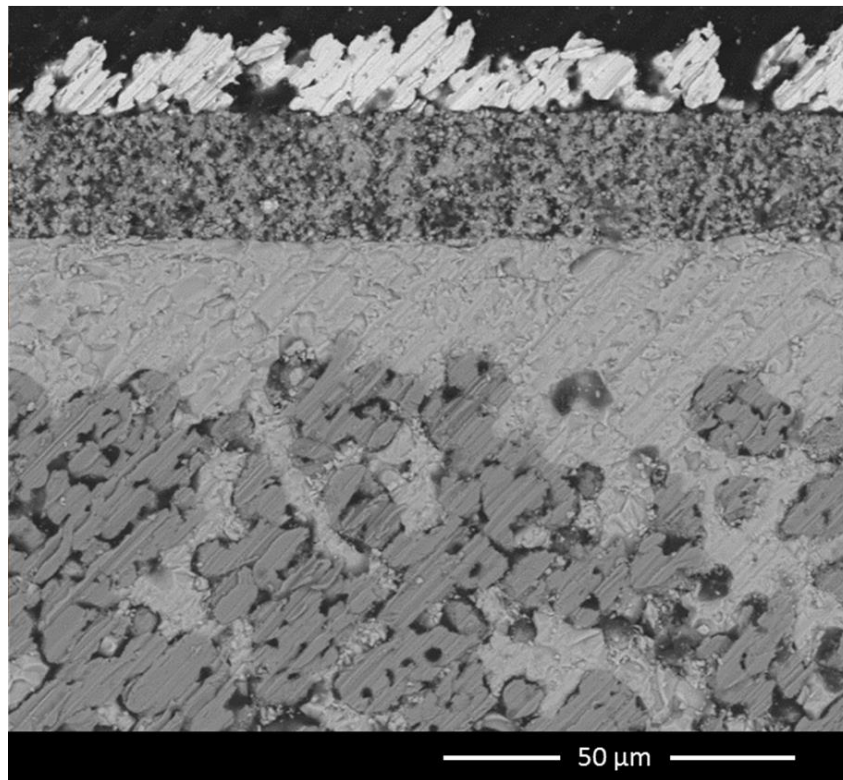


Figure 1. Cross sectional SEM image of porous Ni-BZCY cermet support tube wall (bottom), dense BZCY electrolyte, porous BGLC-BZCY cermet anode, and metallic current collector. This illustrates the typical microstructure of Generation 1 and Generation 2 tubular PCEs developed in ELECTRA.

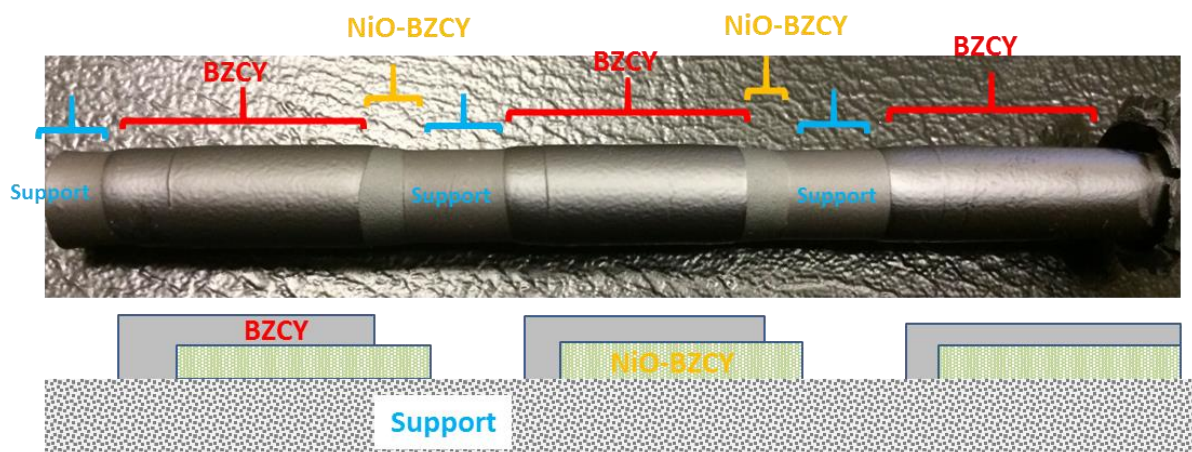
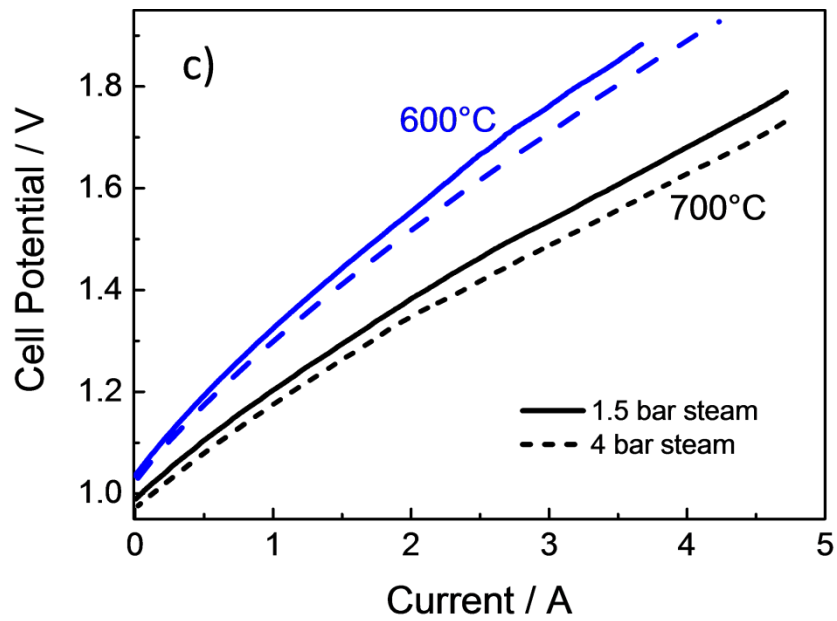


Figure 2. Camera picture of 3-segment tube (top) and schematic wall structure (bottom) of Generation 3 showing inert porous support tube with co-sintered NiO-BZCY cermet cathode and electrolyte layers (interconnect and anode not yet deposited). The segmented-in-series geometry allows higher packing density, higher voltage, and lower overall current, and hence lowers demand on current collectors for tubular electrochemical cells.



*Figure 3. Cell potential vs current for tubular segment during operation in electrolysis mode showing positive effects of temperature (700 vs 600°C) and steam pressure (4 vs 1.5 bar). These results represent a step-change improvement in the performance of intermediate-temperature steam electrolyzers based on proton ceramics.*



*Figure 4. Multi-tubular 1 kW 20 bar electrolyser module unit for 18 tubes with easy tube insertion from cold side and individual monitoring, shut-off, and replacement during operation.*