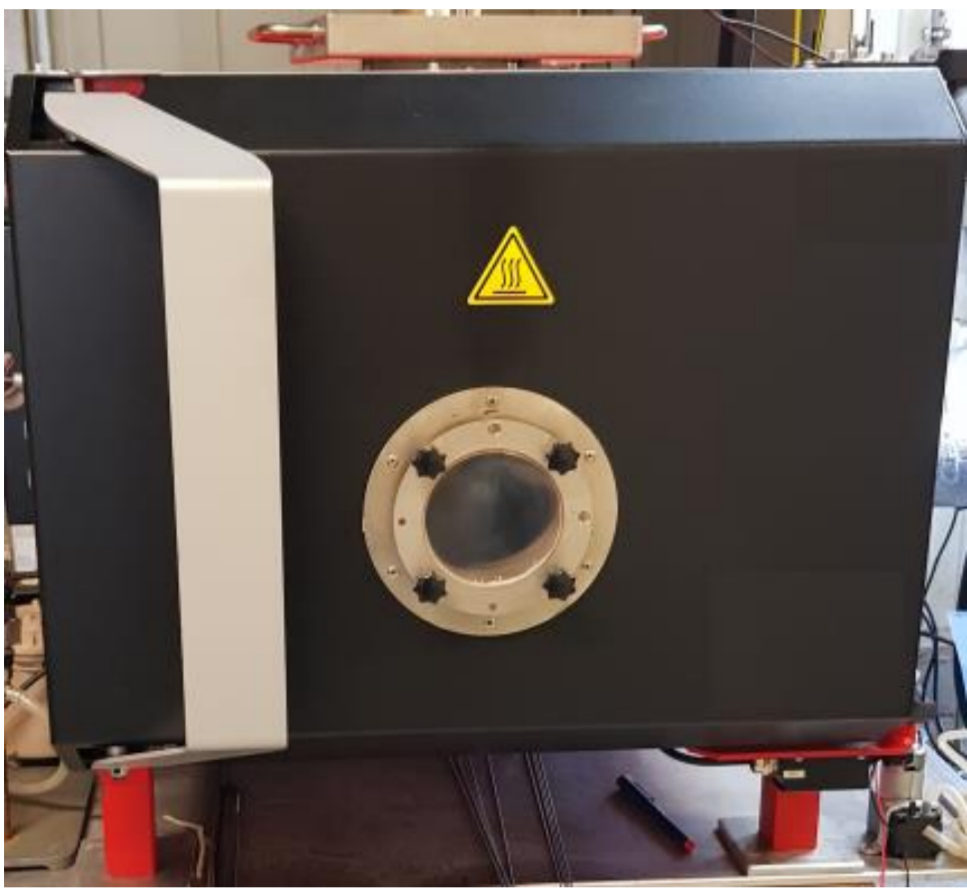


# Experimental study of laboratory molten salt fuel cell with CFRP materials

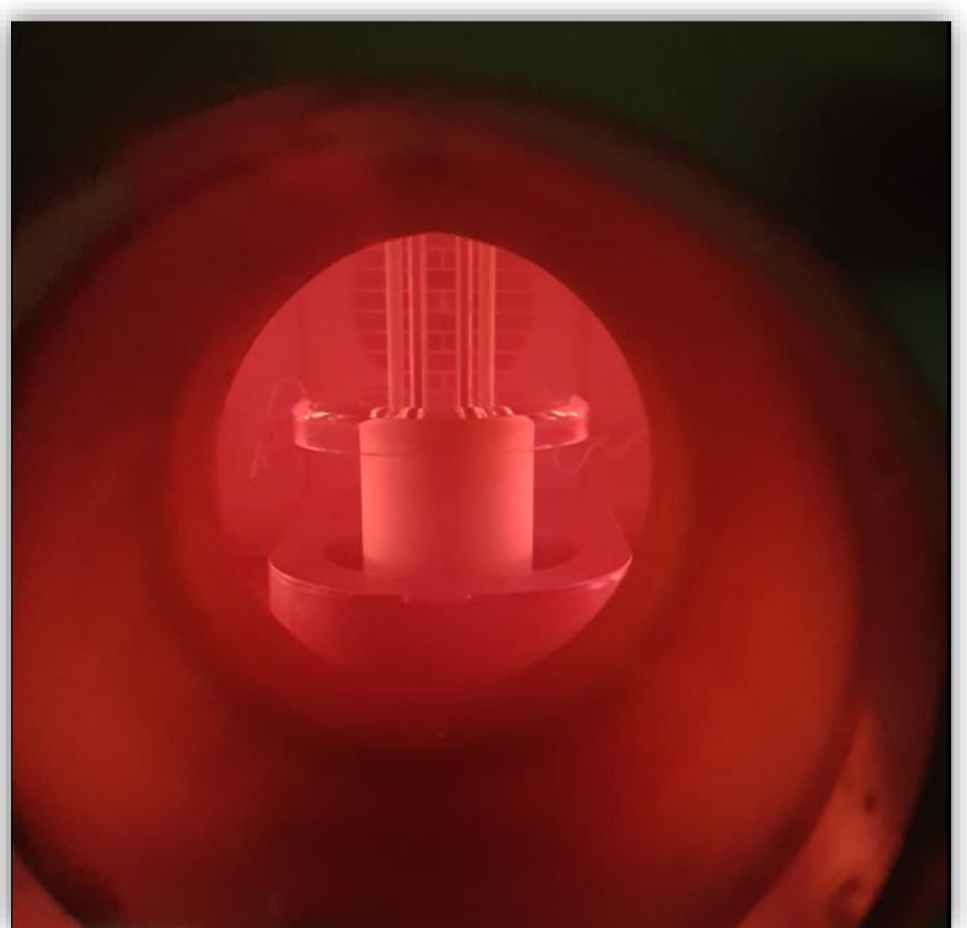
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## Test facility

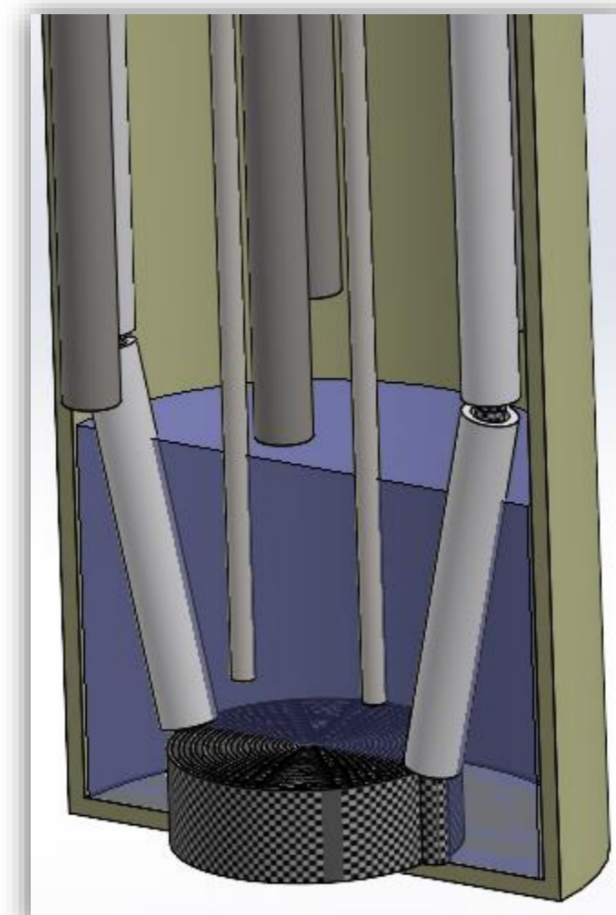


Test facility includes a furnace with operating temperature up to 800°C. Tests are carried out at atmospheric pressure. Fuel cell voltage and current are measured between anode-to-cathode and between anode-to-reference electrode, respectively.



Experimental stand includes impedance measurement device, Micro-GC System, FTIR and equipment for control of cell operational parameters.

## Fuel cell



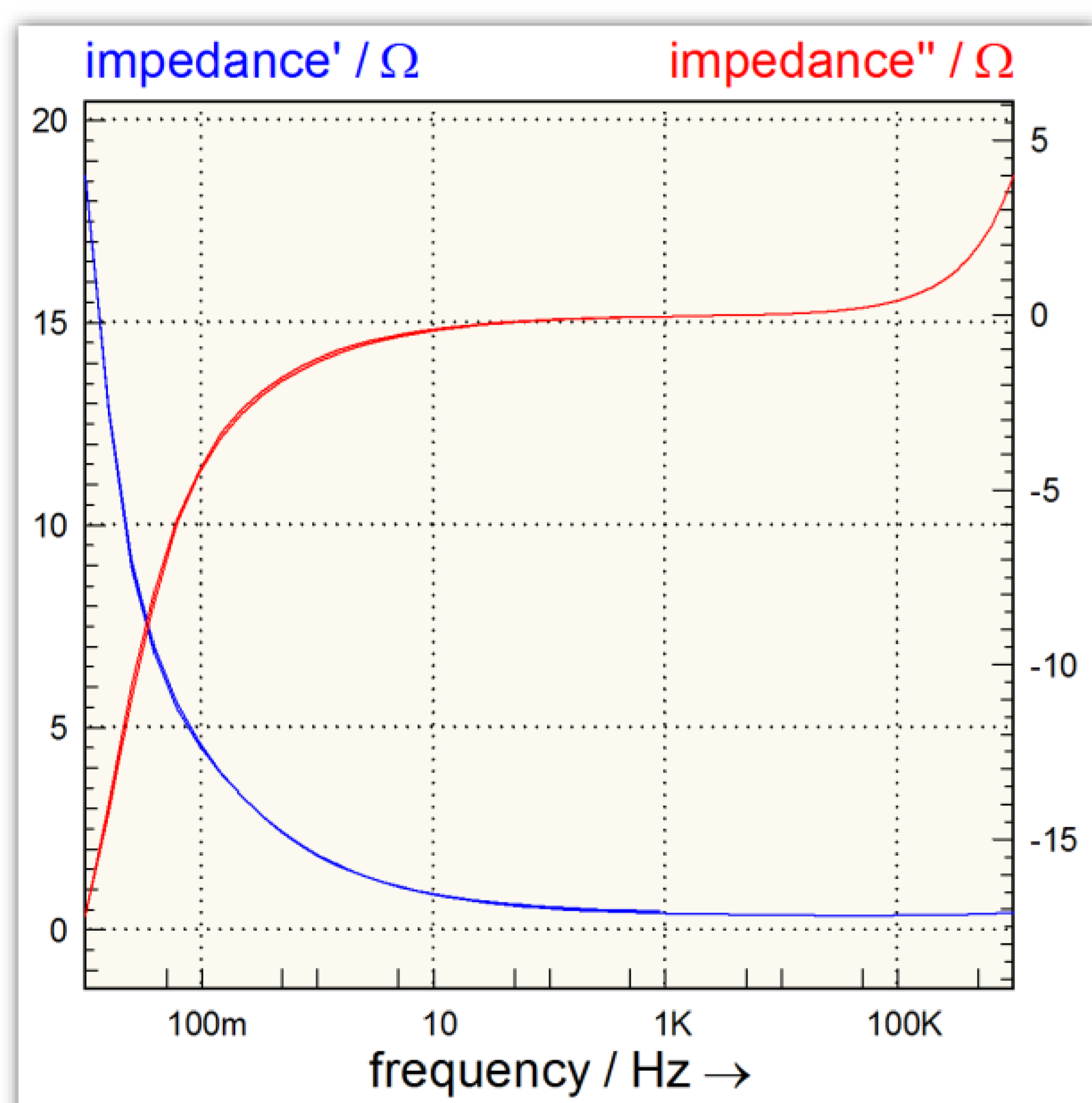
Fuel cell consists on a ceramic crucible, anode, cathode and reference electrode. The fuel cell includes corresponding sensors for measurement of the temperature inside and outside the crucible.



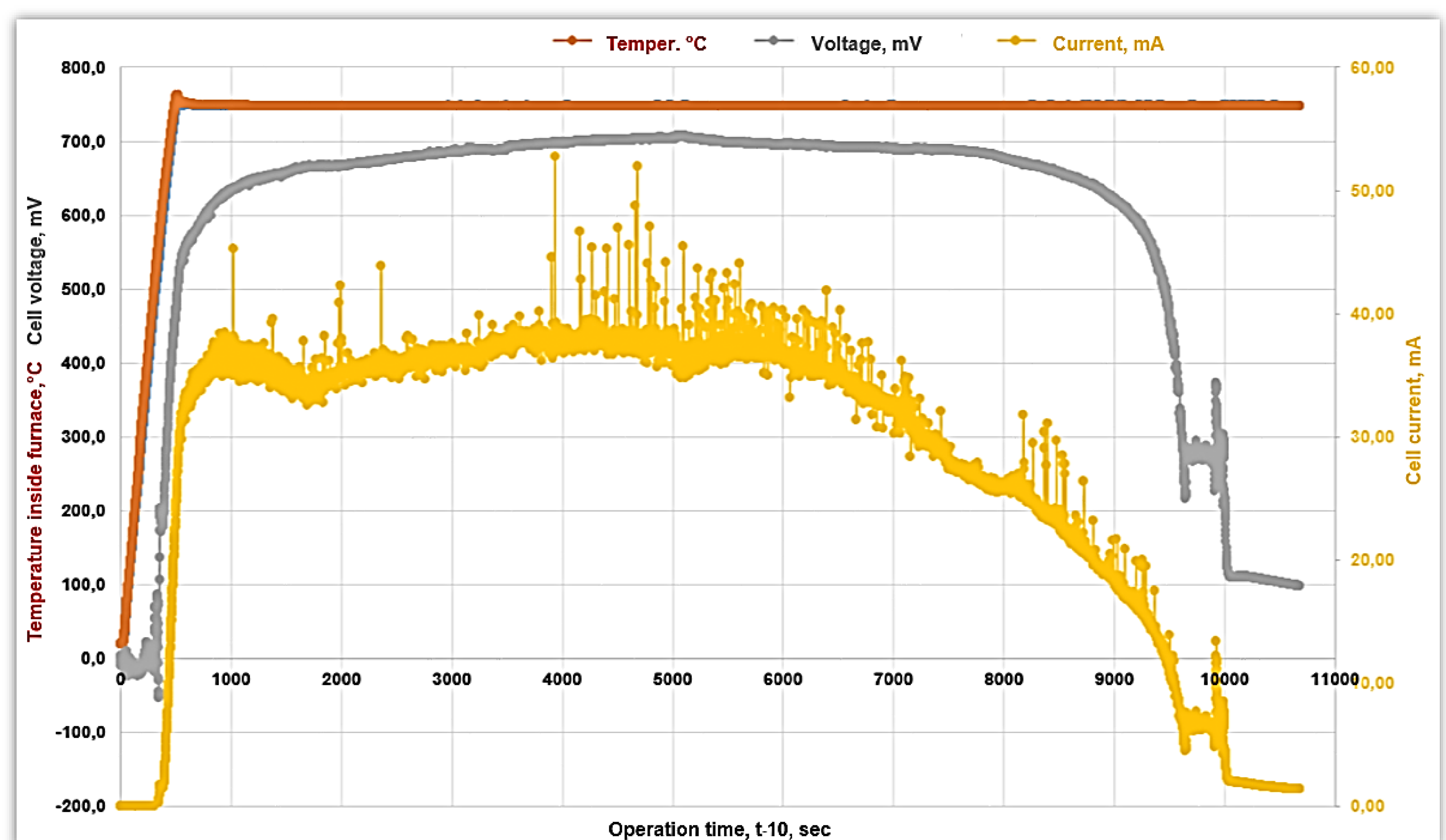
The melt of a ternary salt mixture of 43,5 wt.%  $\text{Li}_2\text{CO}_3$ , 31,5 wt.%  $\text{K}_2\text{CO}_3$  and 25,0 wt.%  $\text{Na}_2\text{CO}_3$  is used as an electrolyte. Carbon fibers, as well as CFRP materials, are used as fuel.

## Results

### Anode-cathode constellation

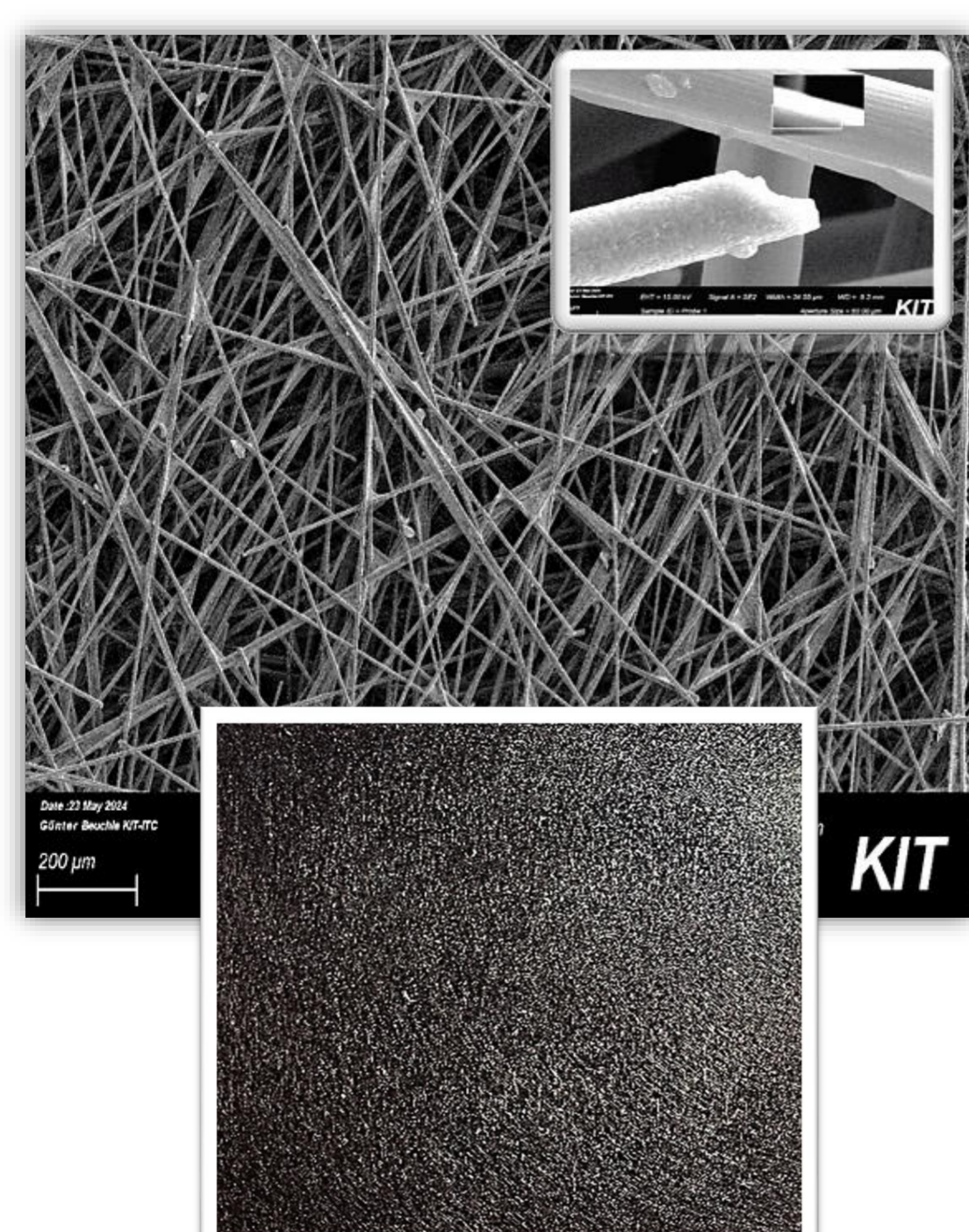


Impedance measurement

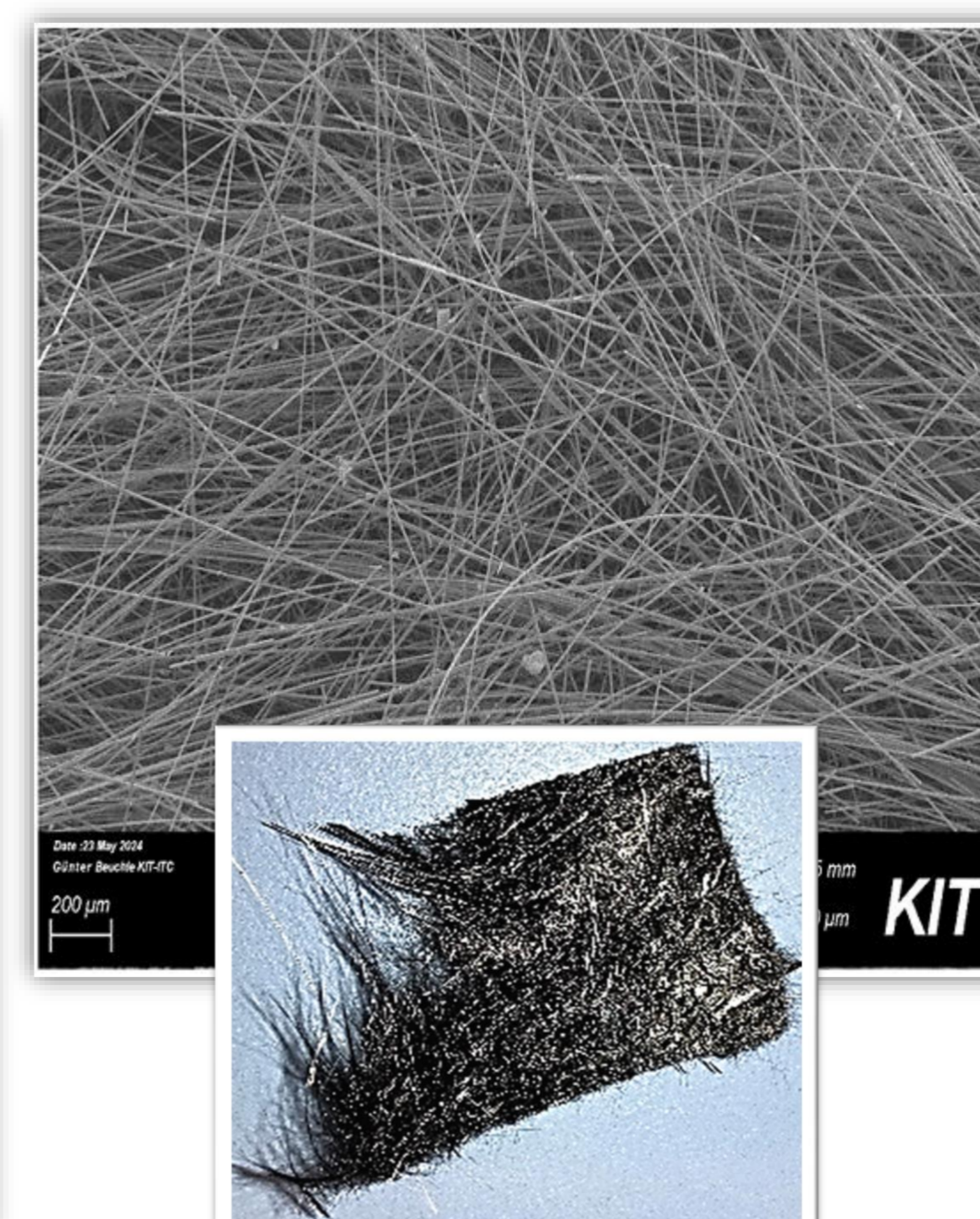
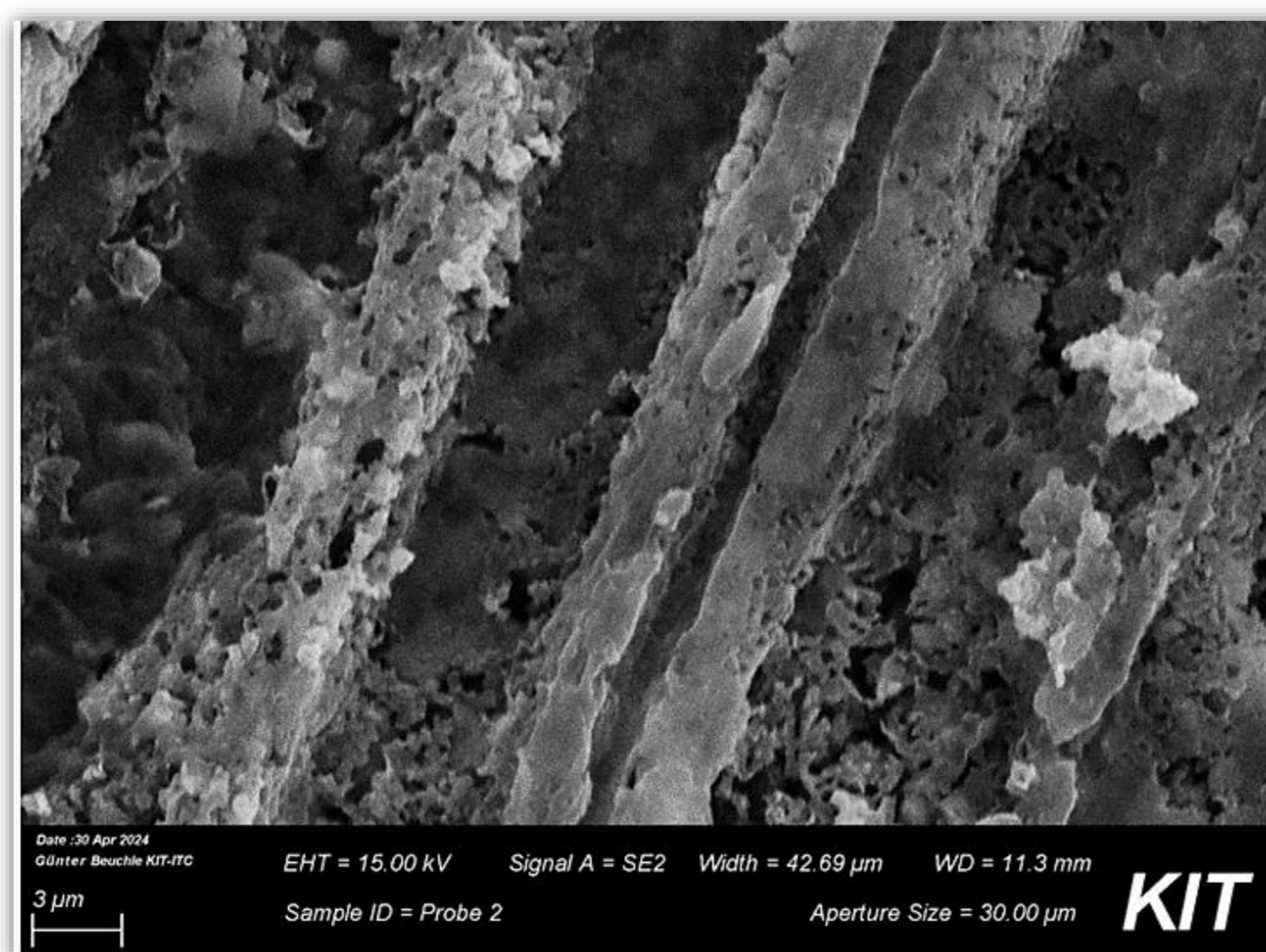


Temporal evolution of fuel cell parameters

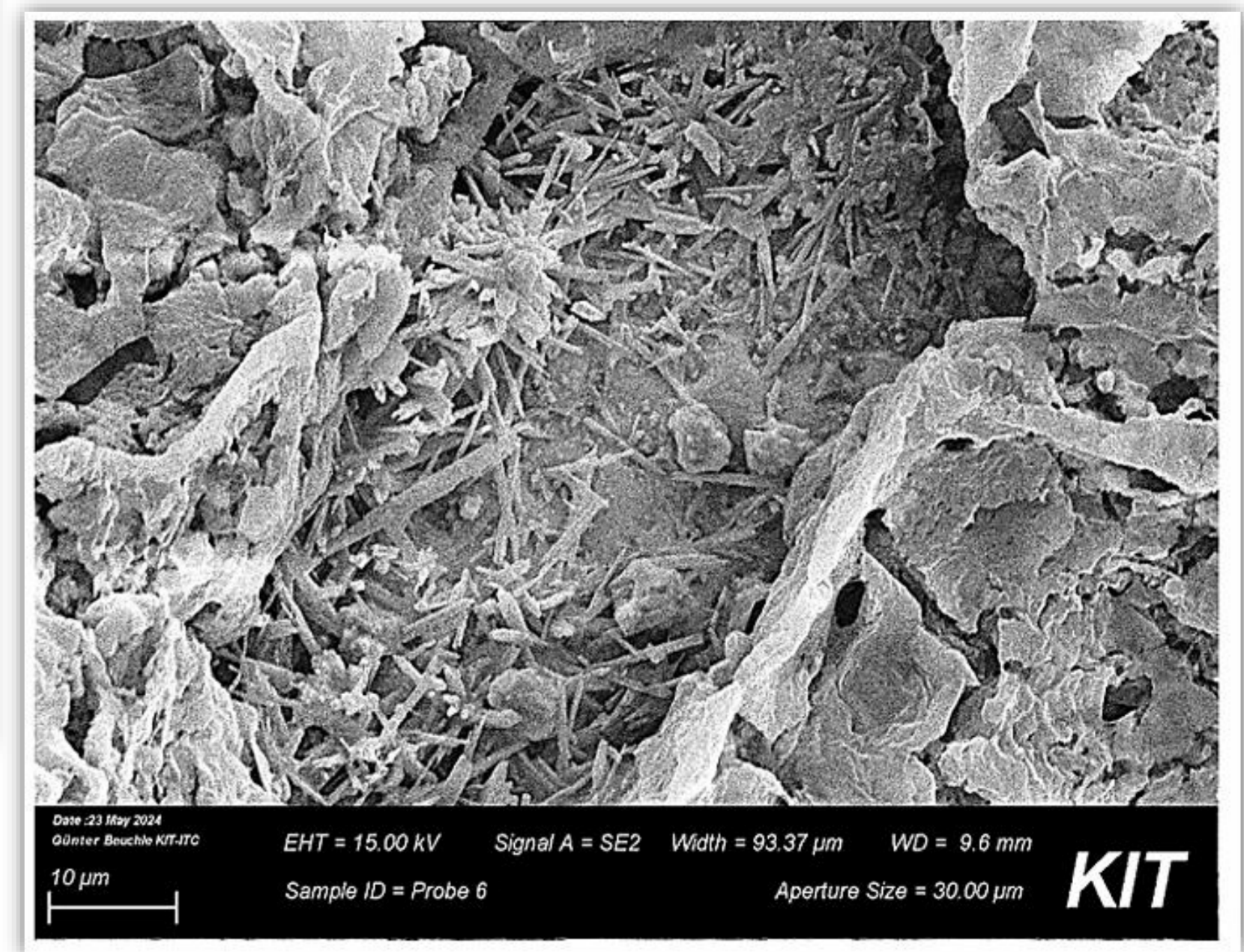
## Observations



CFRP: Sample 1



CFRP: Sample 2



## Conclusions

- A fuel cell, which uses CFRP materials and carbon fibers as fuel, is developed.
- With increase in temperature, cell voltage and current increase. Fuel cell parameters depend on operating temperature, electrode design, molten salt properties, gas generation due to electrochemical reactions, etc.
- In the fuel cell, strong degradation of carbon fibers takes place.