



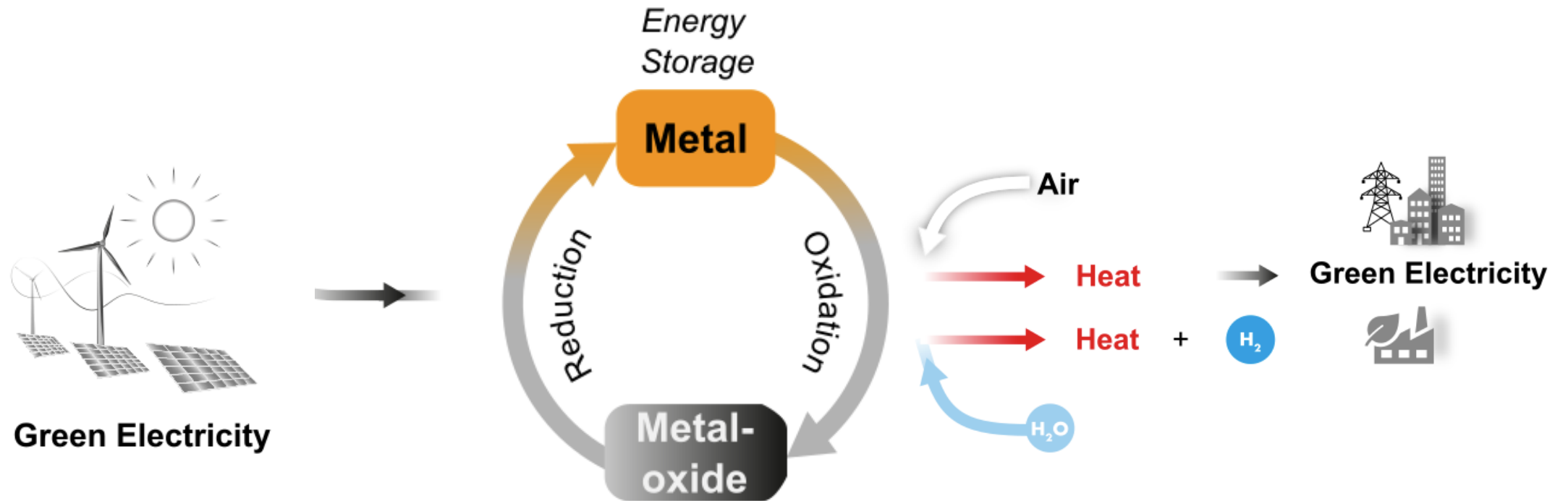
FLOW ELECTROCHEMISTRY FOR THE METAL ENERGY CYCLE

Prof. Dr.-Ing. John Linkhorst – Process Engineering of Electrochemical Systems

ERCOFTAC Autumn Festival 2025

9.10.2025

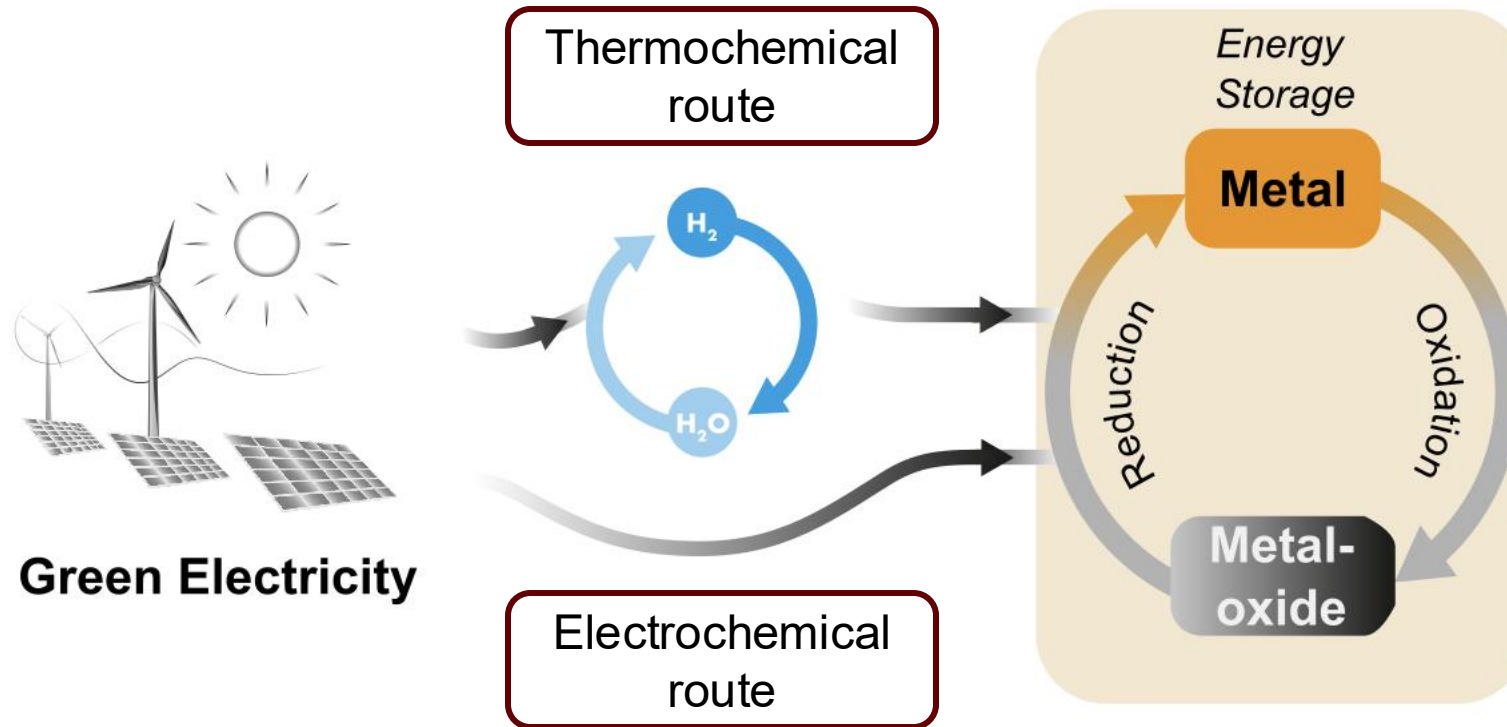
THE METAL ENERGY CYCLE

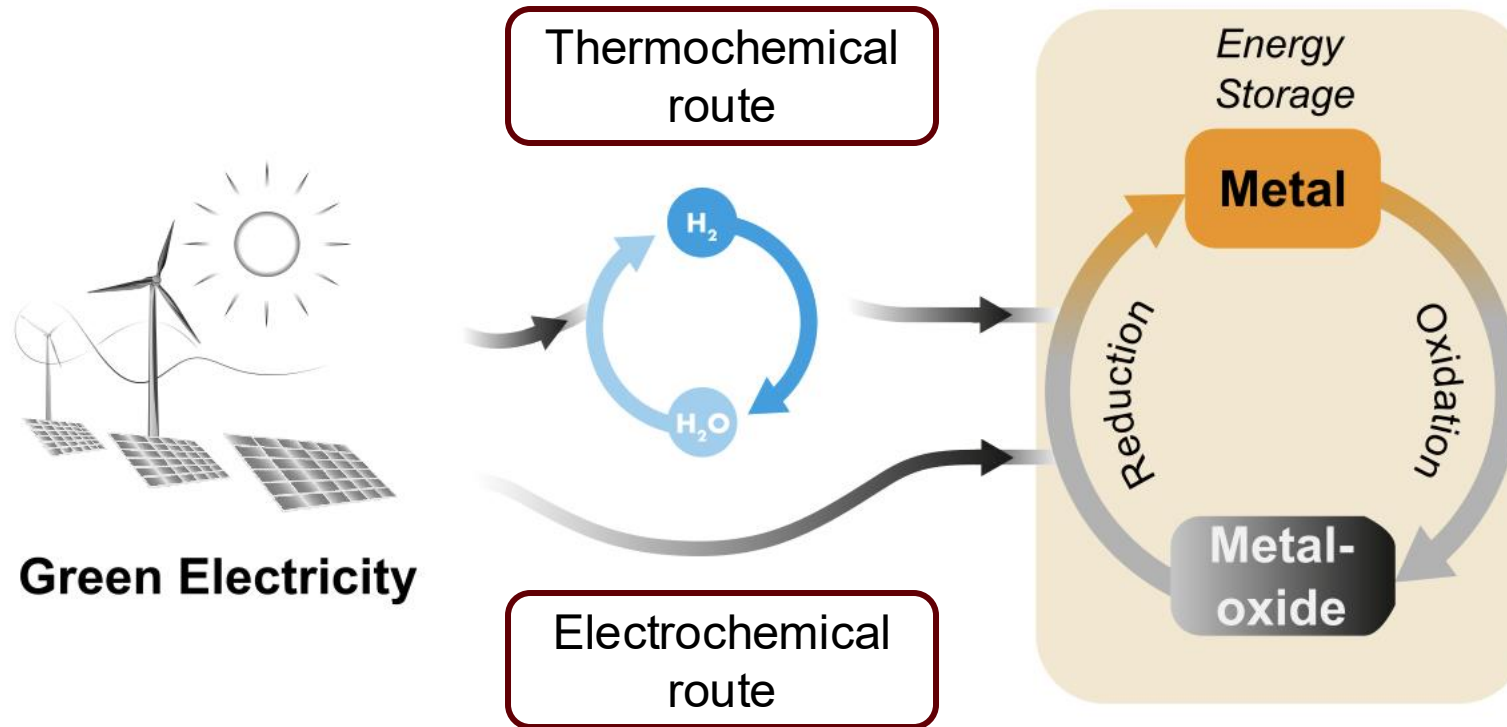


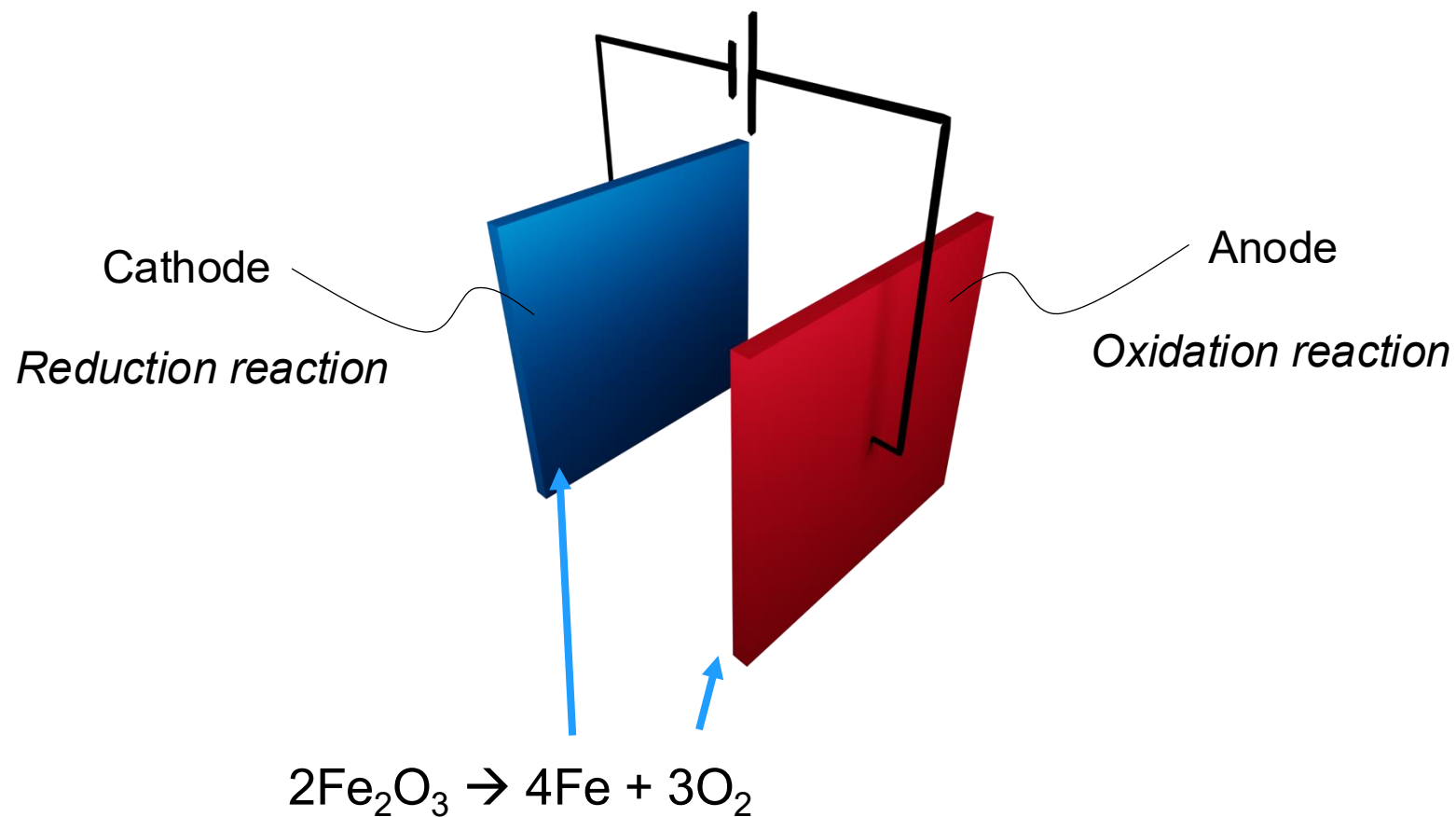
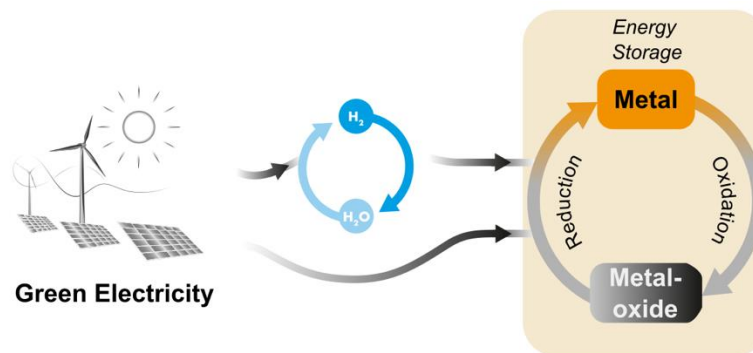
REDUCTION OPTIONS

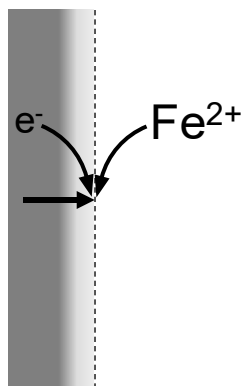
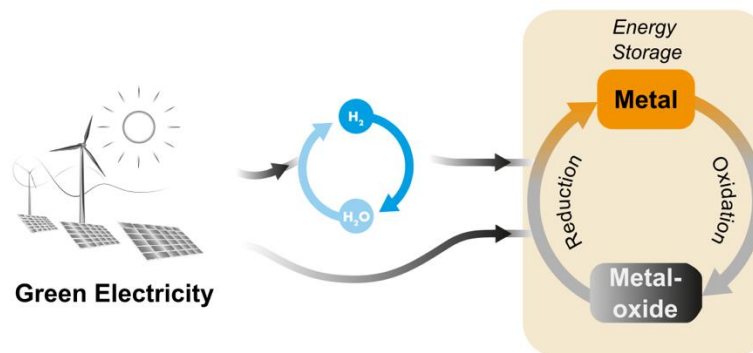


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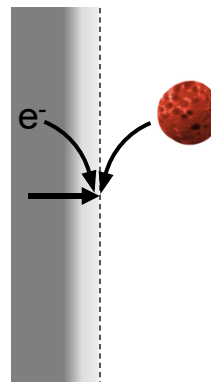




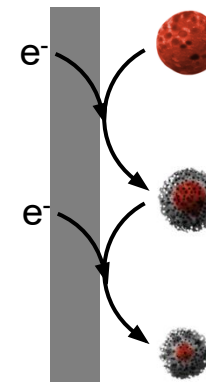




Acidic
electrodeposition



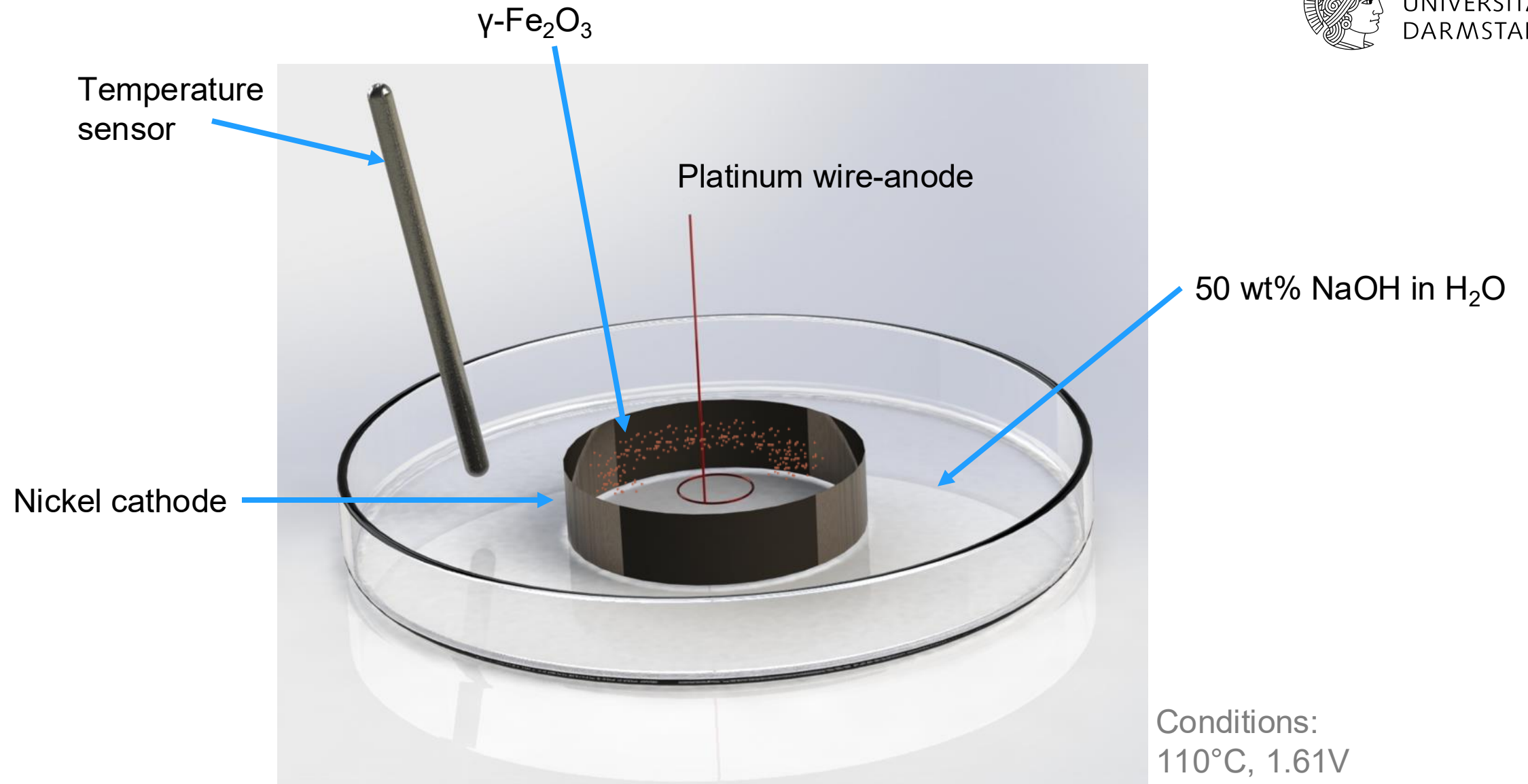
Alkaline
electrodeposition



Direct alkaline
electroreduction

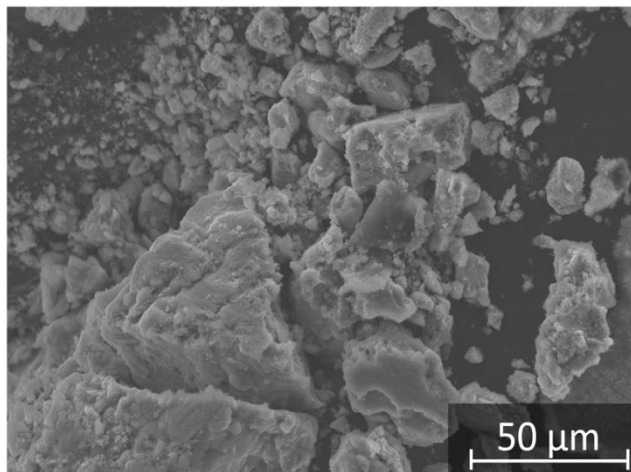


FEASIBILITY CHECK

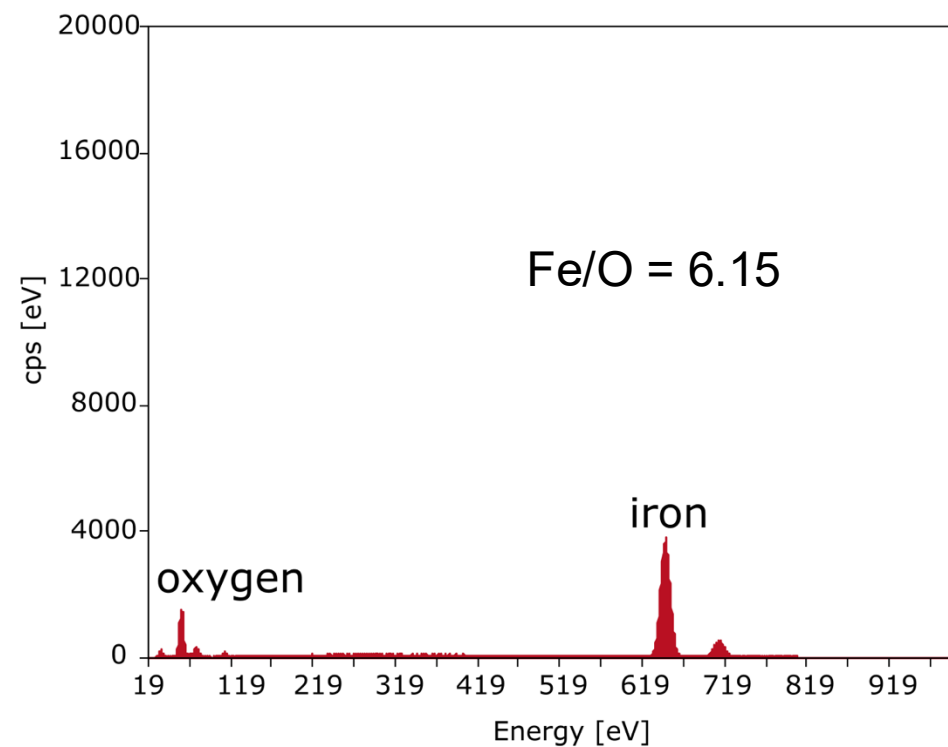
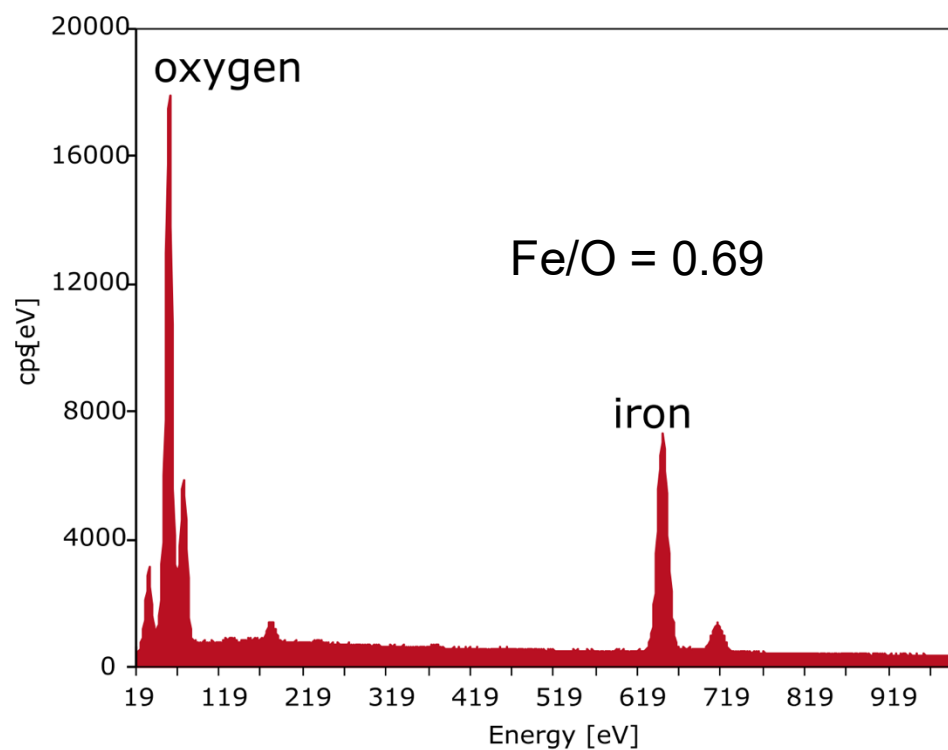
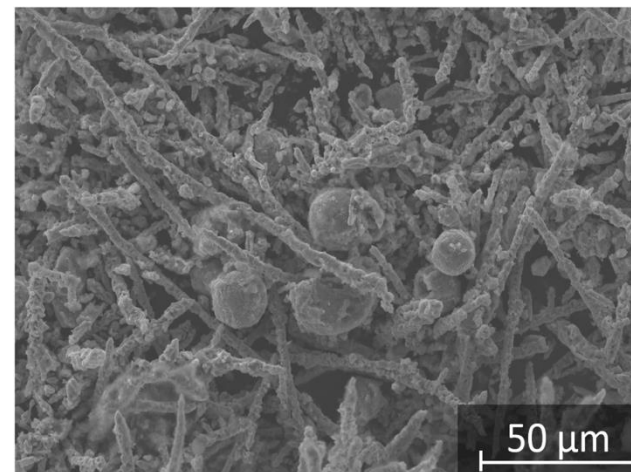




Educt



Product



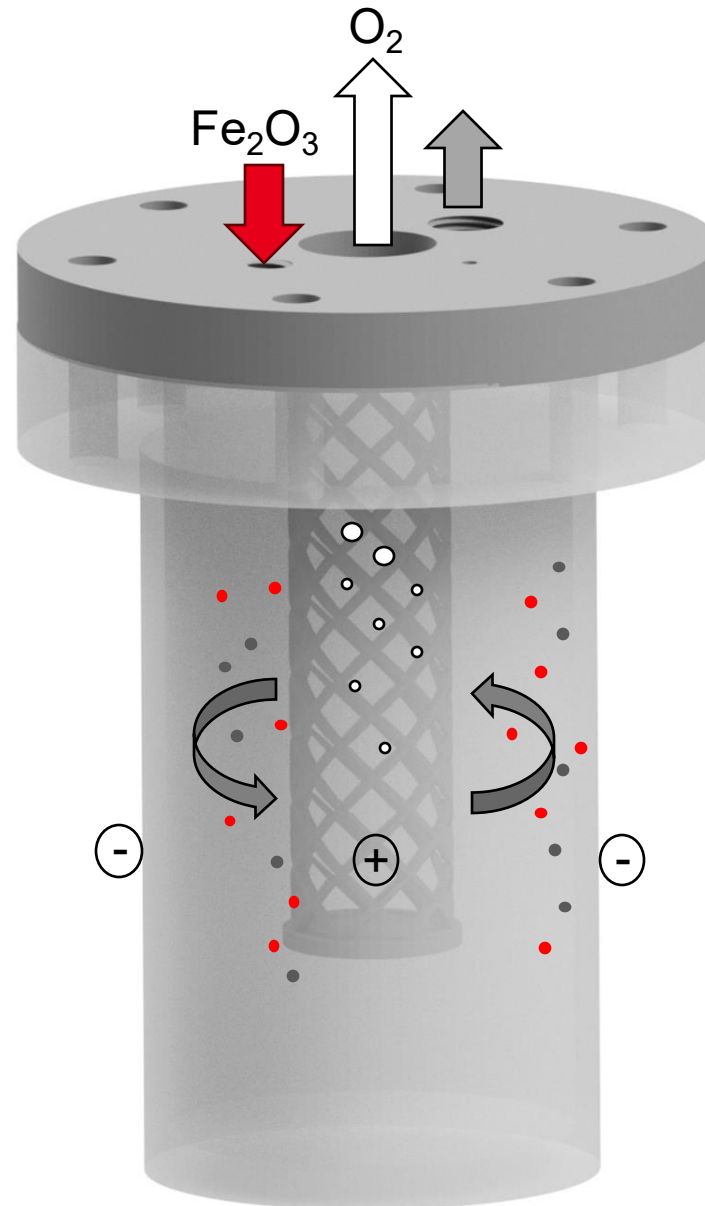


FLOW ELECTROLYSIS

CONTINUOUS SLURRY REACTOR

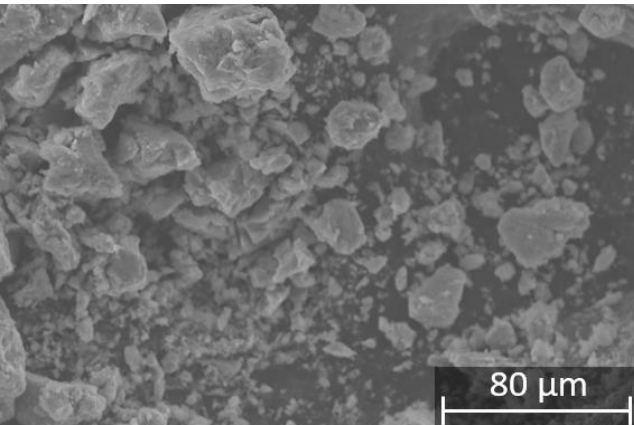


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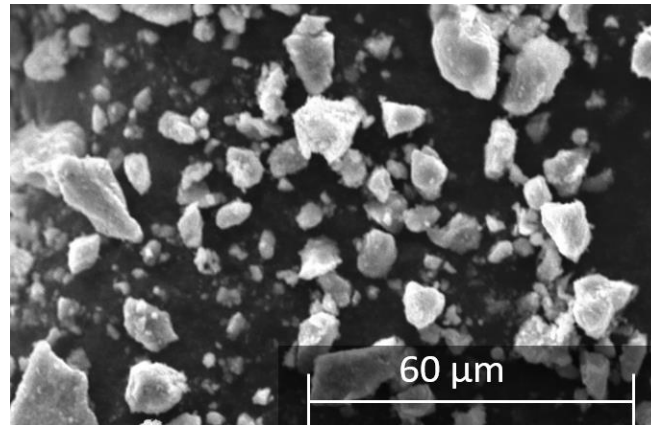


CONTINUOUS SLURRY REACTOR

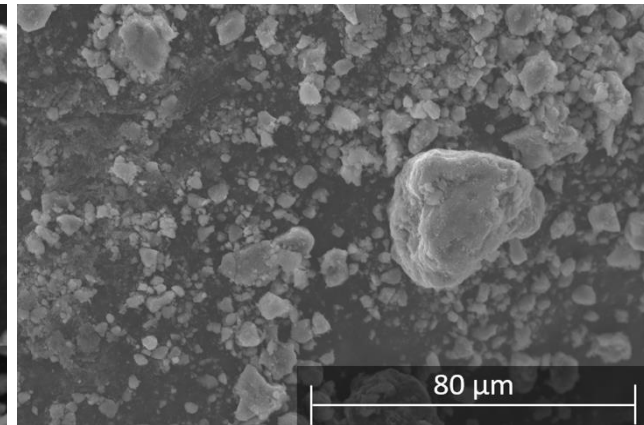
SEM-images during reduction



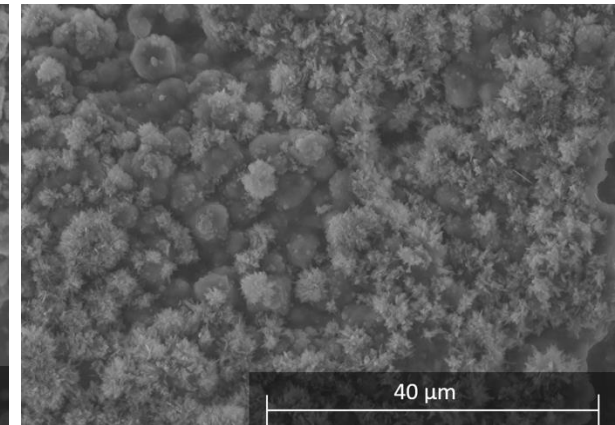
1min



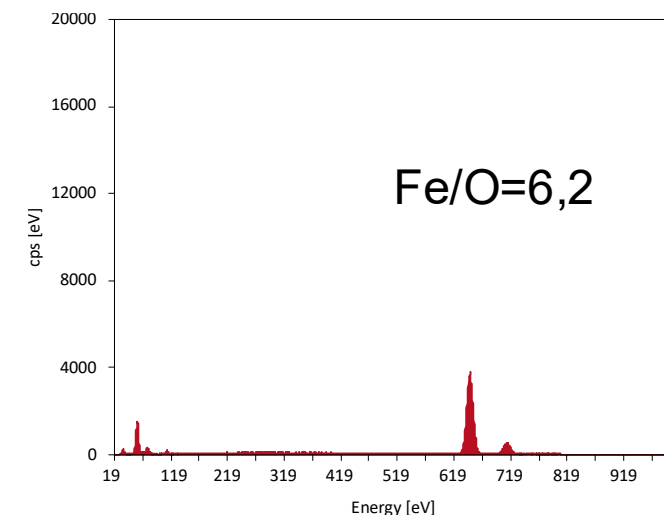
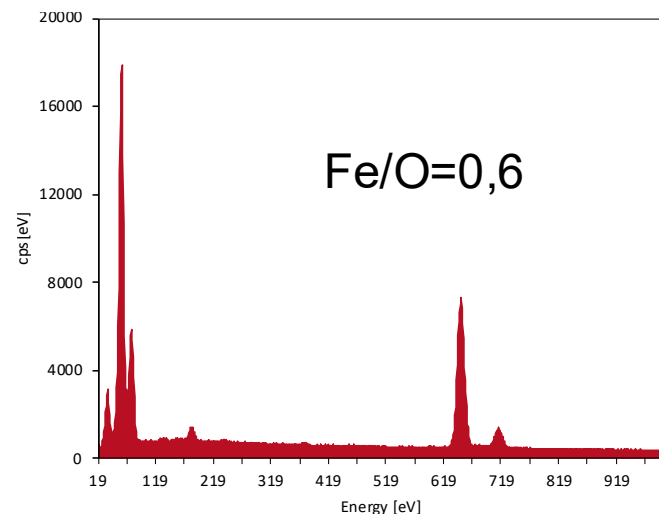
5min



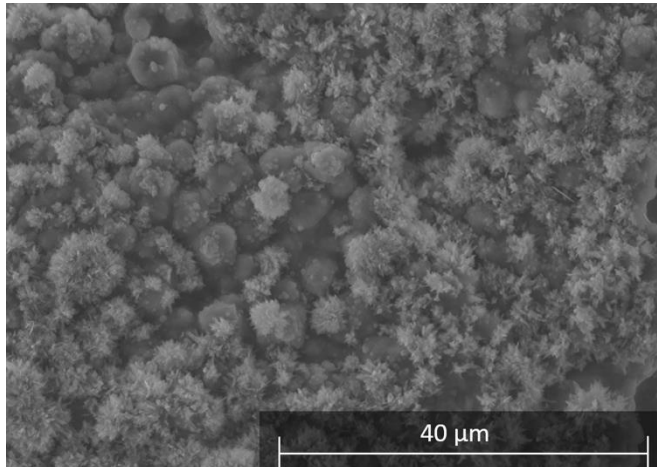
10min



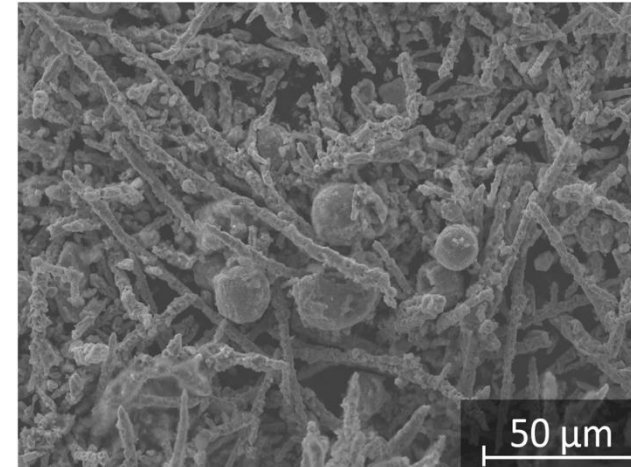
30min

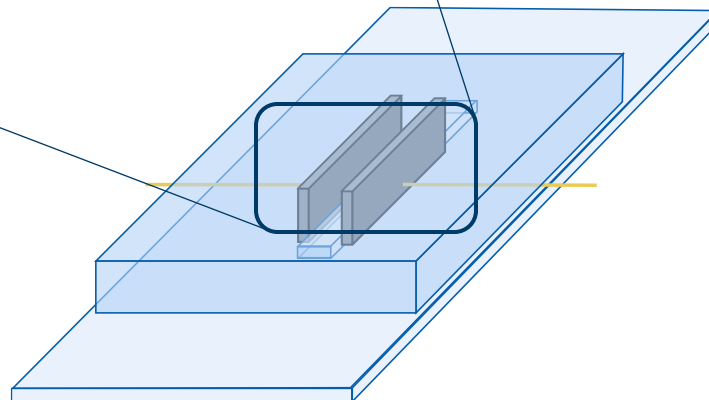
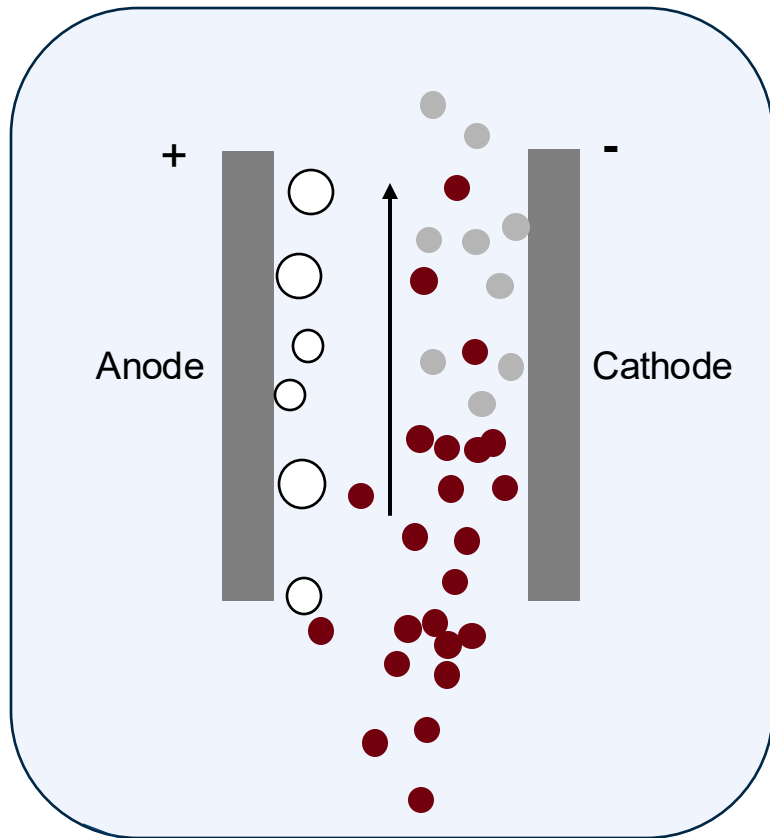


Flow reactor

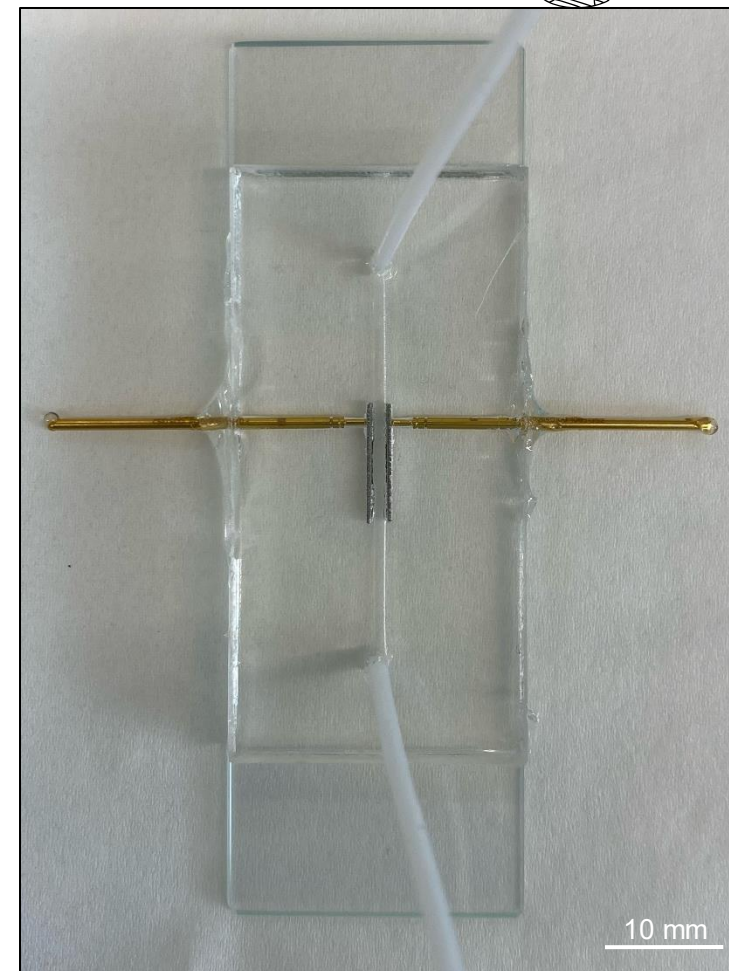
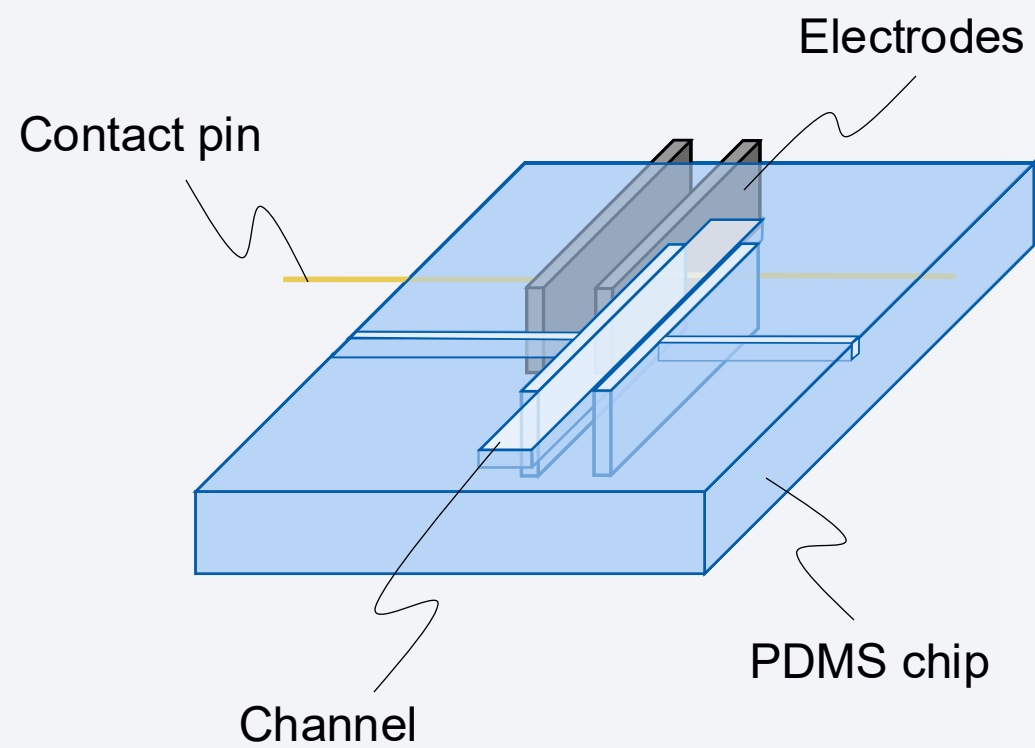


Feasibility test

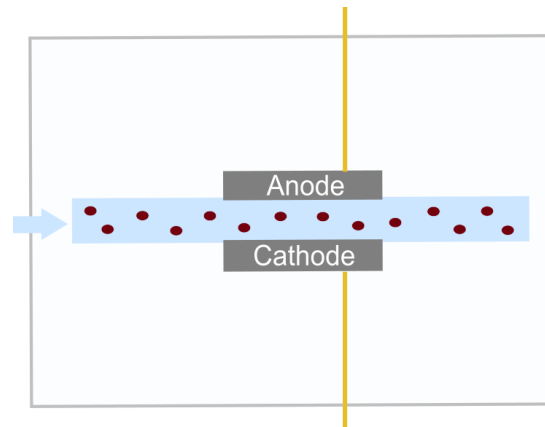




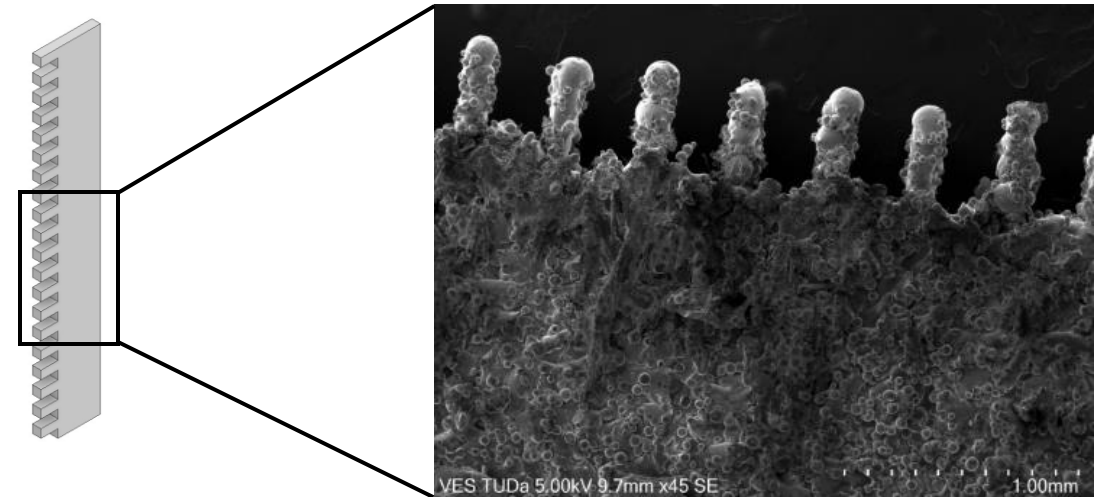
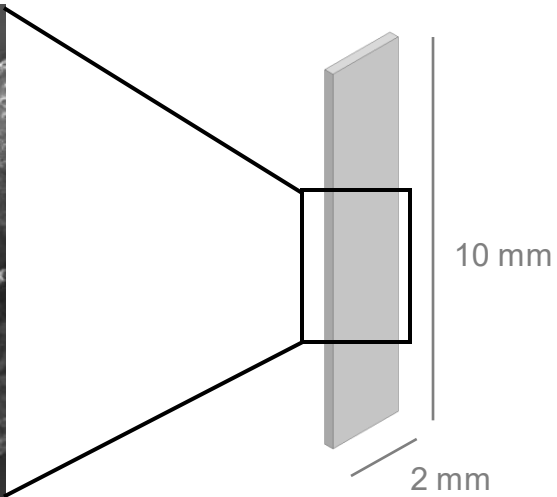
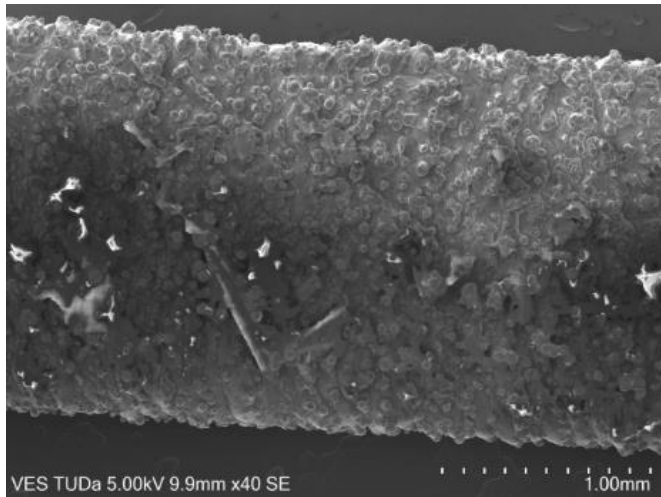
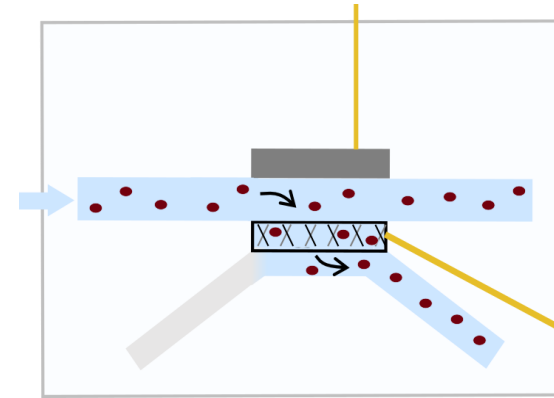
How do the particles interact with
the electrode?

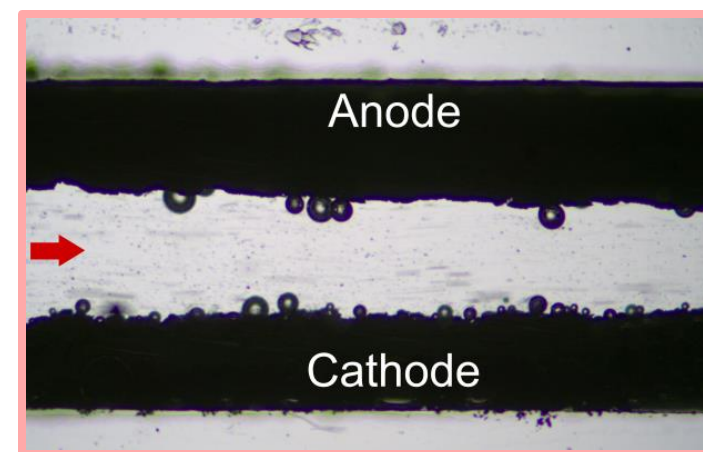
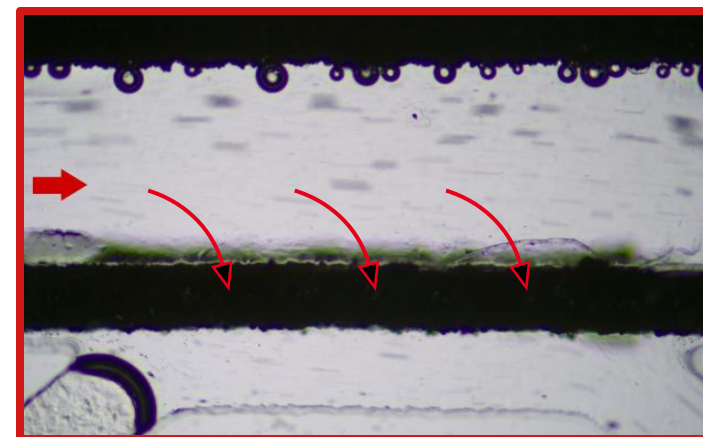
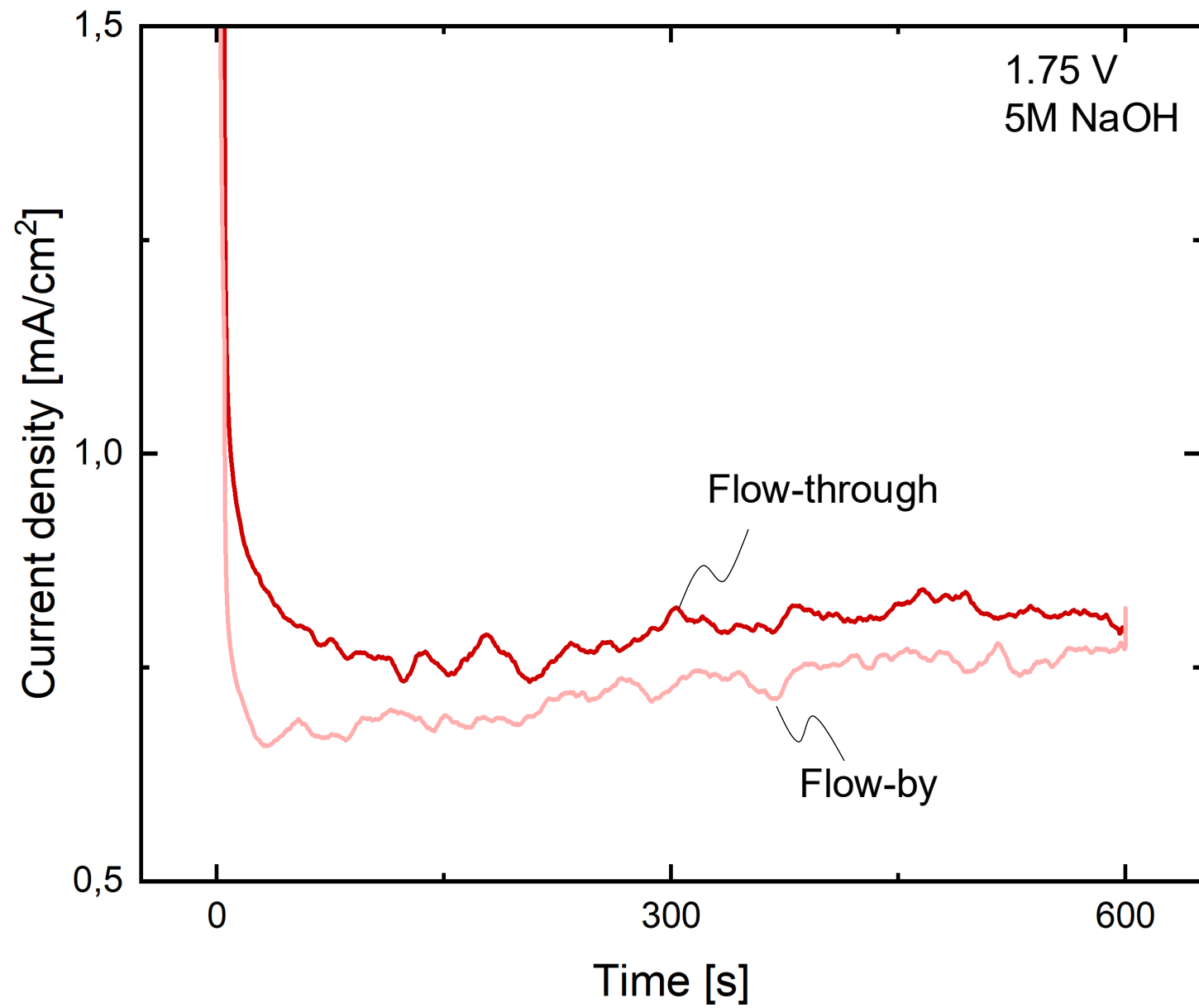


Flow-by

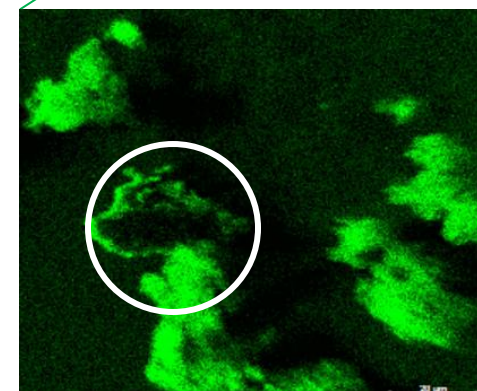
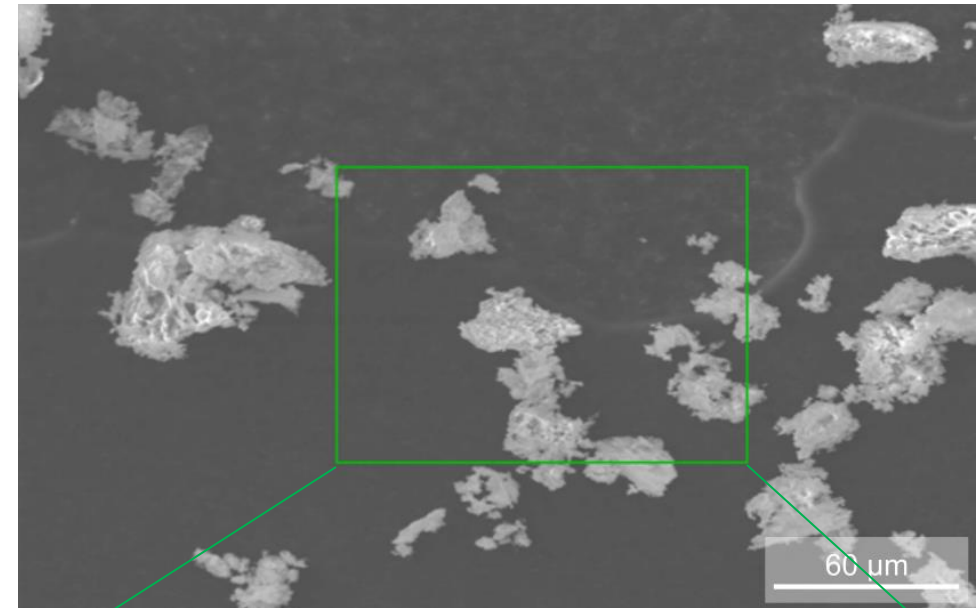
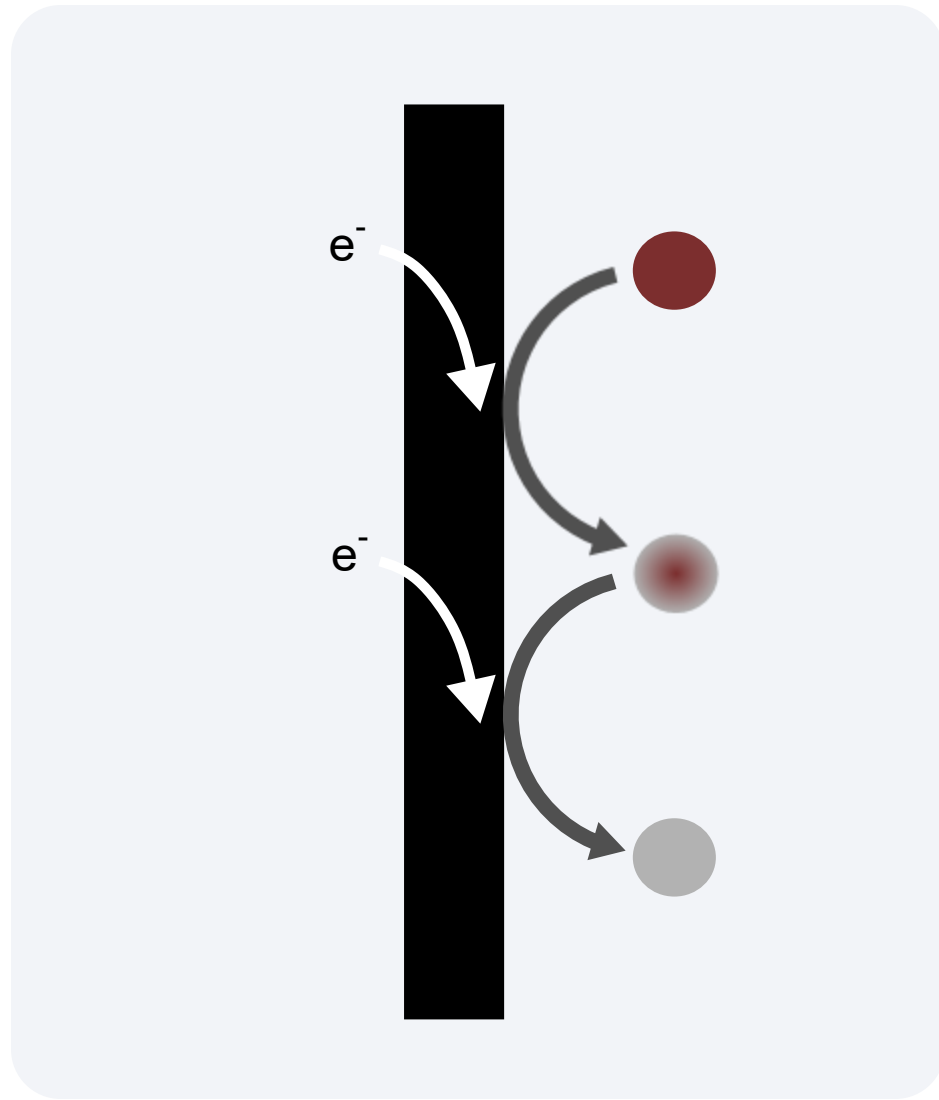


Flow-through

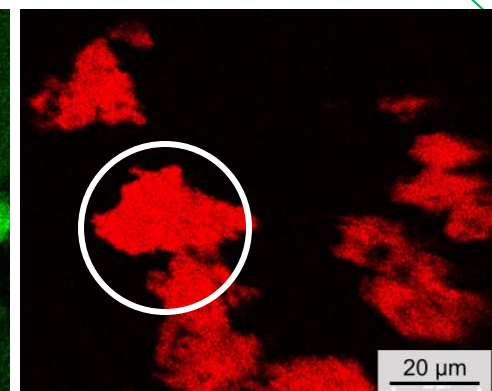




Solid-state reduction



Oxygen



Iron

STAY TUNED FOR THE NEXT DEVELOPMENTS

