$FeCO_3$ Stabilisation

Corrosion Product Augmentation

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Managers and Mentors
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TotalEnergies

Corrosion Products

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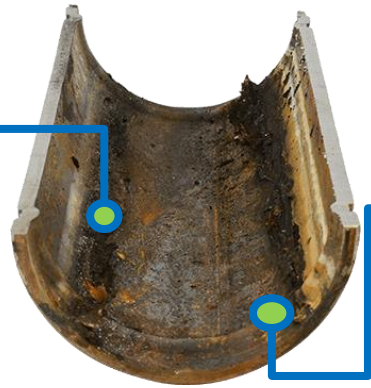
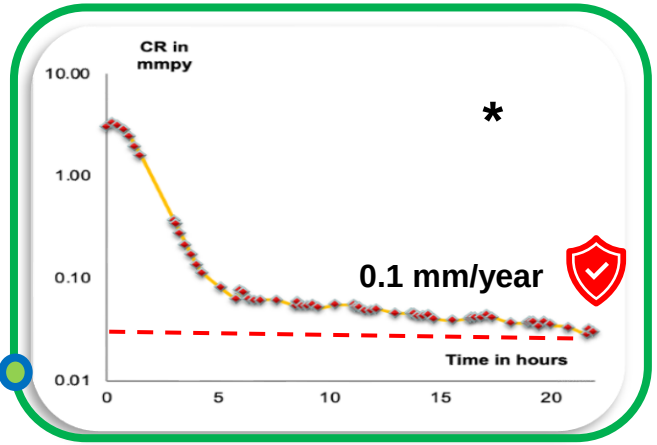
Metal Alloy in:

1. Oil and Gas
2. Nuclear
3. CCS
4. Geothermal

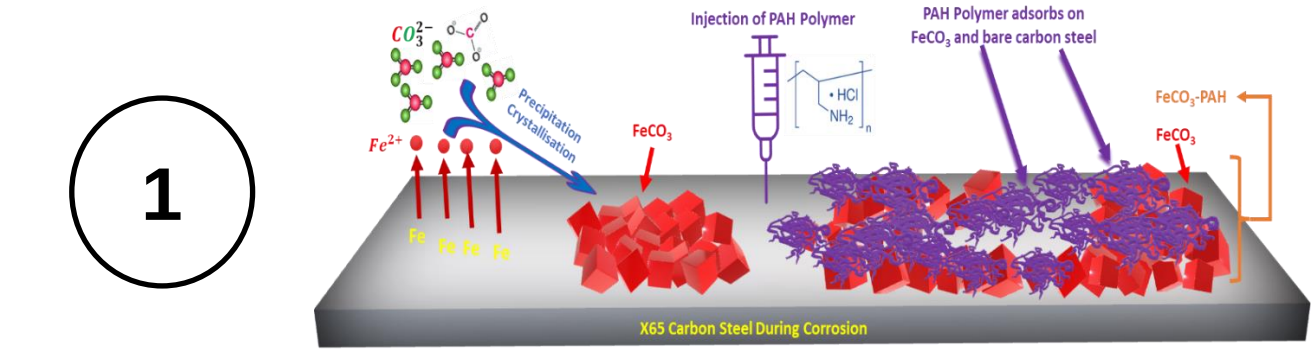


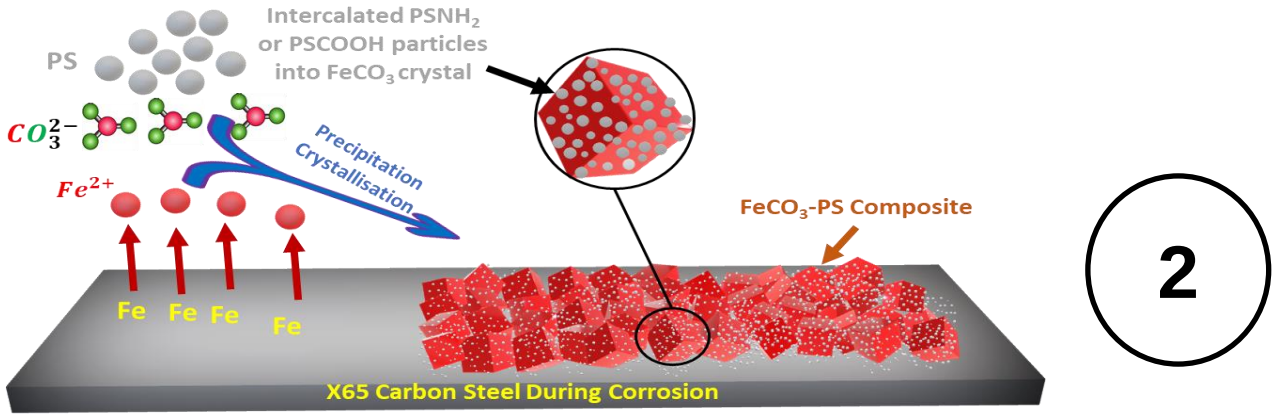
Protective CORROSION PRODUCTS:

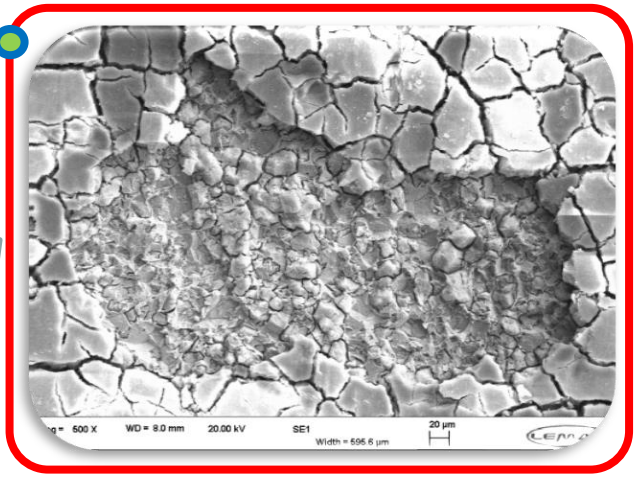
1. Cementite
2. Magnetite
3. Iron sulphide
4. Iron carbonate ($FeCO_3$)



Augmentation Strategies







Loose Mechanical Properties and chemical resistance

1st Strategy – Corrosion Product Hybrid Film*

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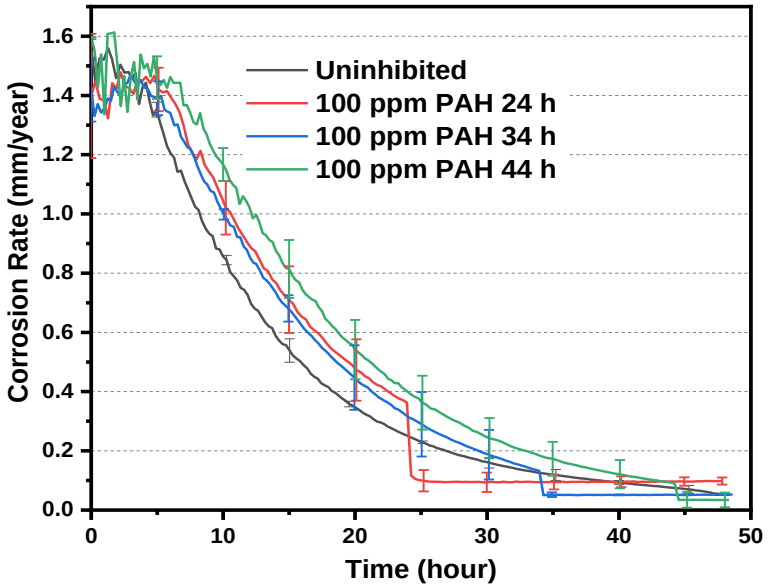
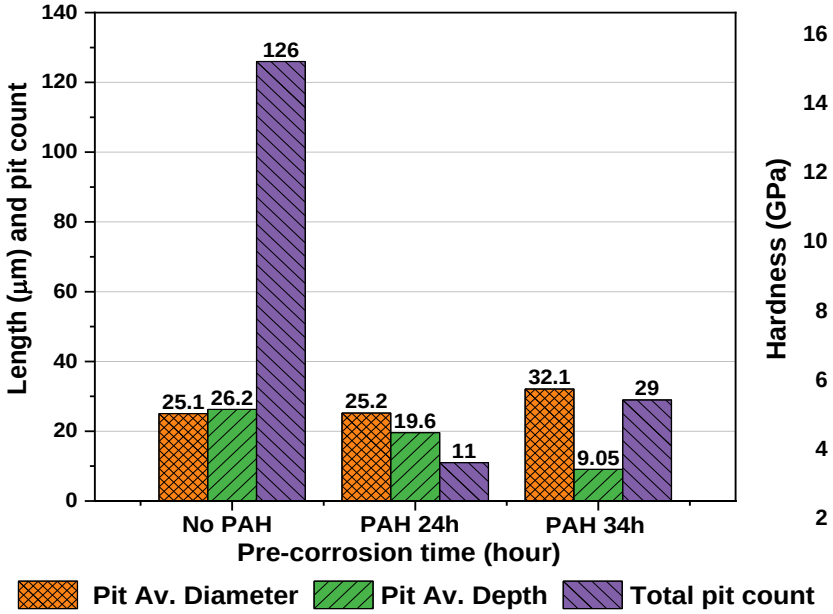
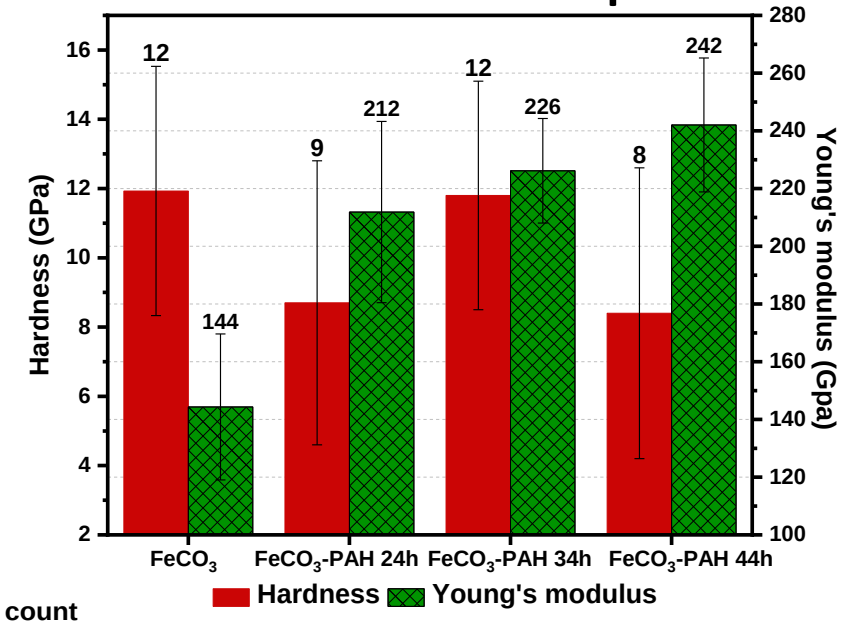
Excellent Corrosion Inhibition



Reduce Localised Corrosion



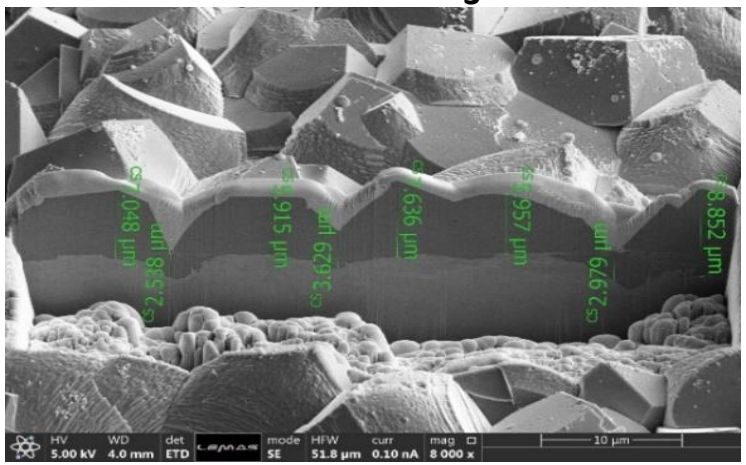
Enhance Mechanical Properties



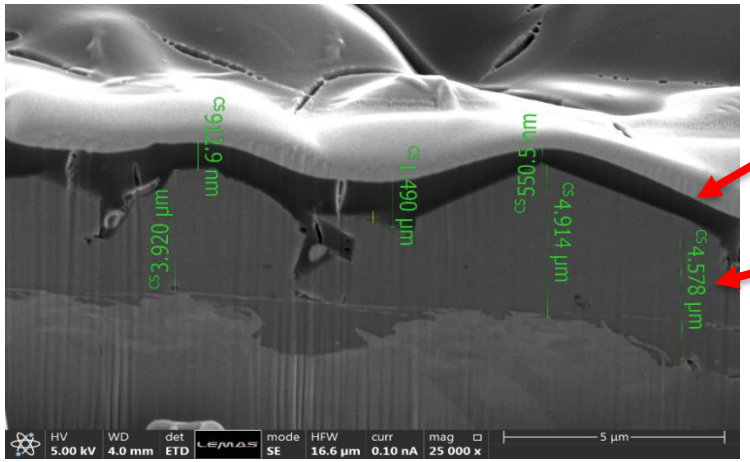
Uniform Adsorption Corrosion Layer

Static condition: glass cell
Temperature: 60°C, pCO_2 : 0.8 bar
Salinity: 35 g·L^{-1} NaCl, Initial pH: ~6.8
Dosage: 100 ppm PAH polymer

$FeCO_3$



$FeCO_3$-Polymer



2nd Strategy – Corrosion Product Composite Layer*

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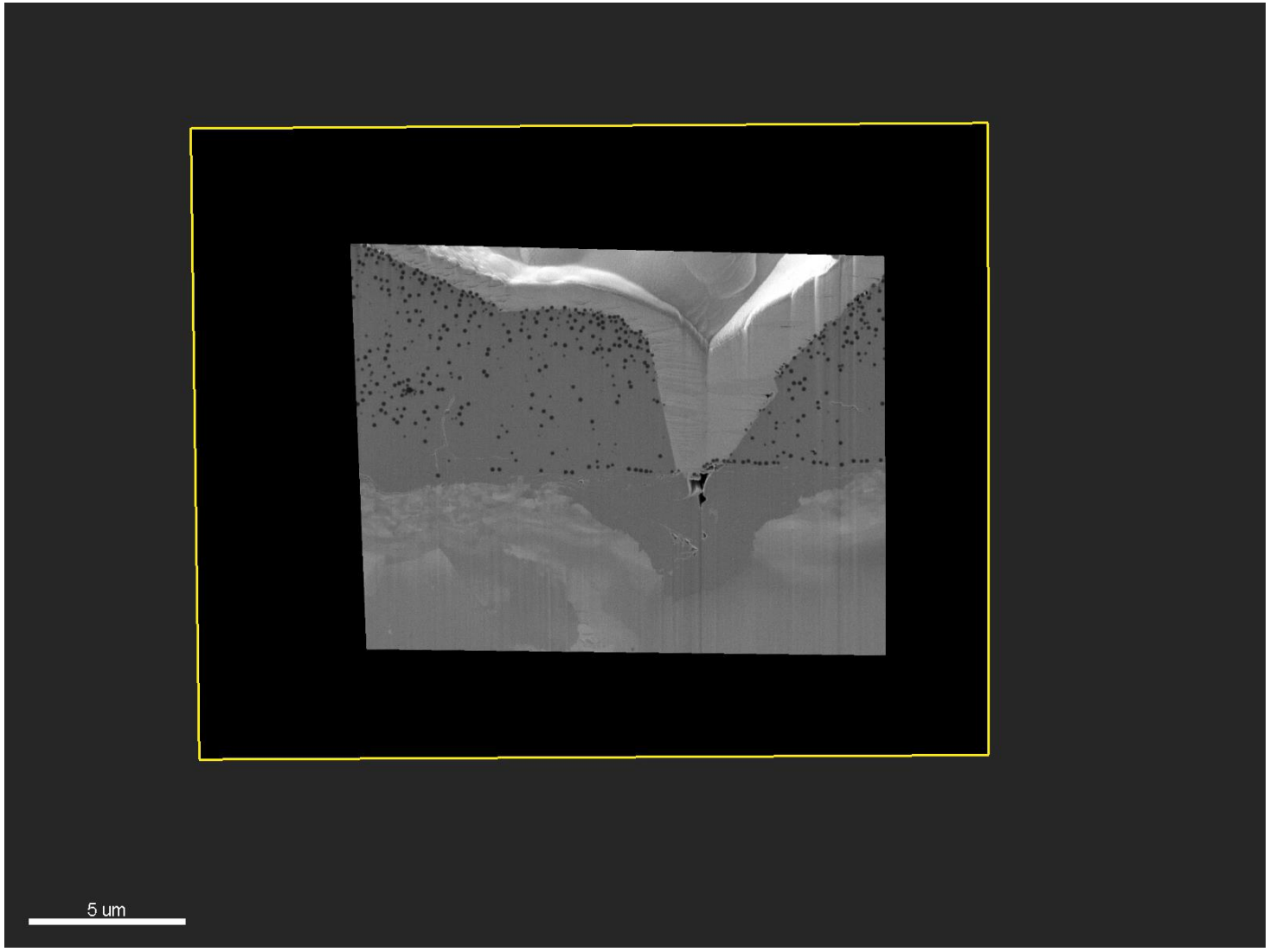
Incorporating polymer particles into corrosion products

Reduce Localised Corrosion



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Current Work

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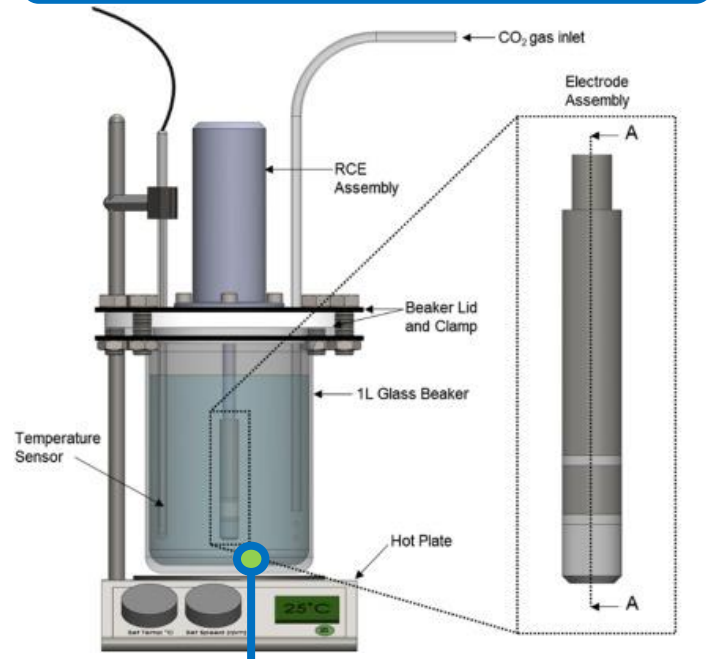
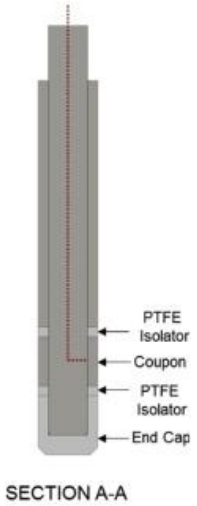
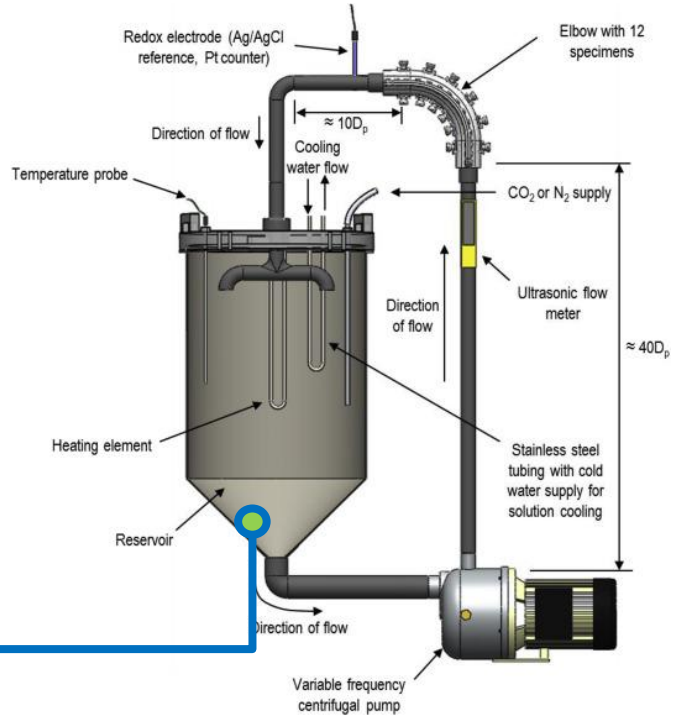
1. Hydrodynamic Condition

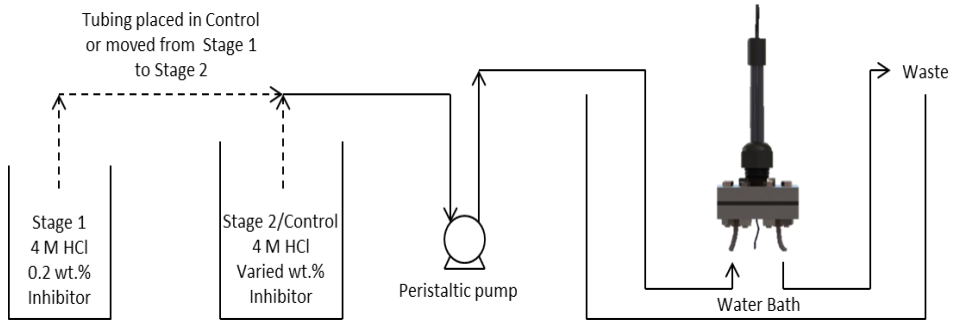


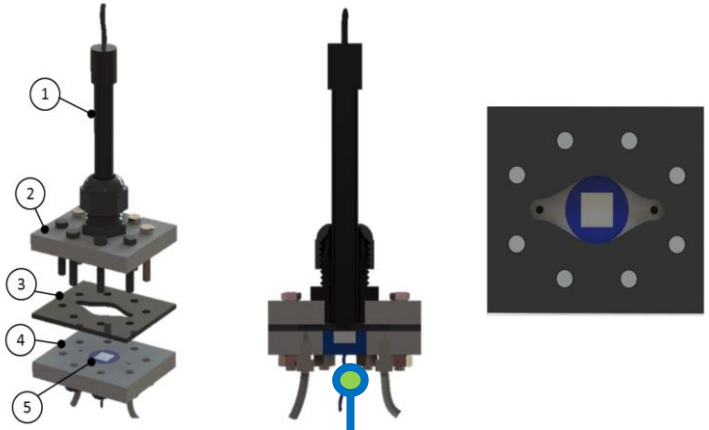


2. Film Stability – High Flow rate



3. Film Dissolution Resistance (Low pH)





Rotating Cylinder Electrode

Submerged Jet Impingement

Microfluidic Cell