



TEKNOLOGISK  
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# NACE Corrosion 2020

Electrochemical investigation of performance of corrosion inhibitor used for oil & gas production

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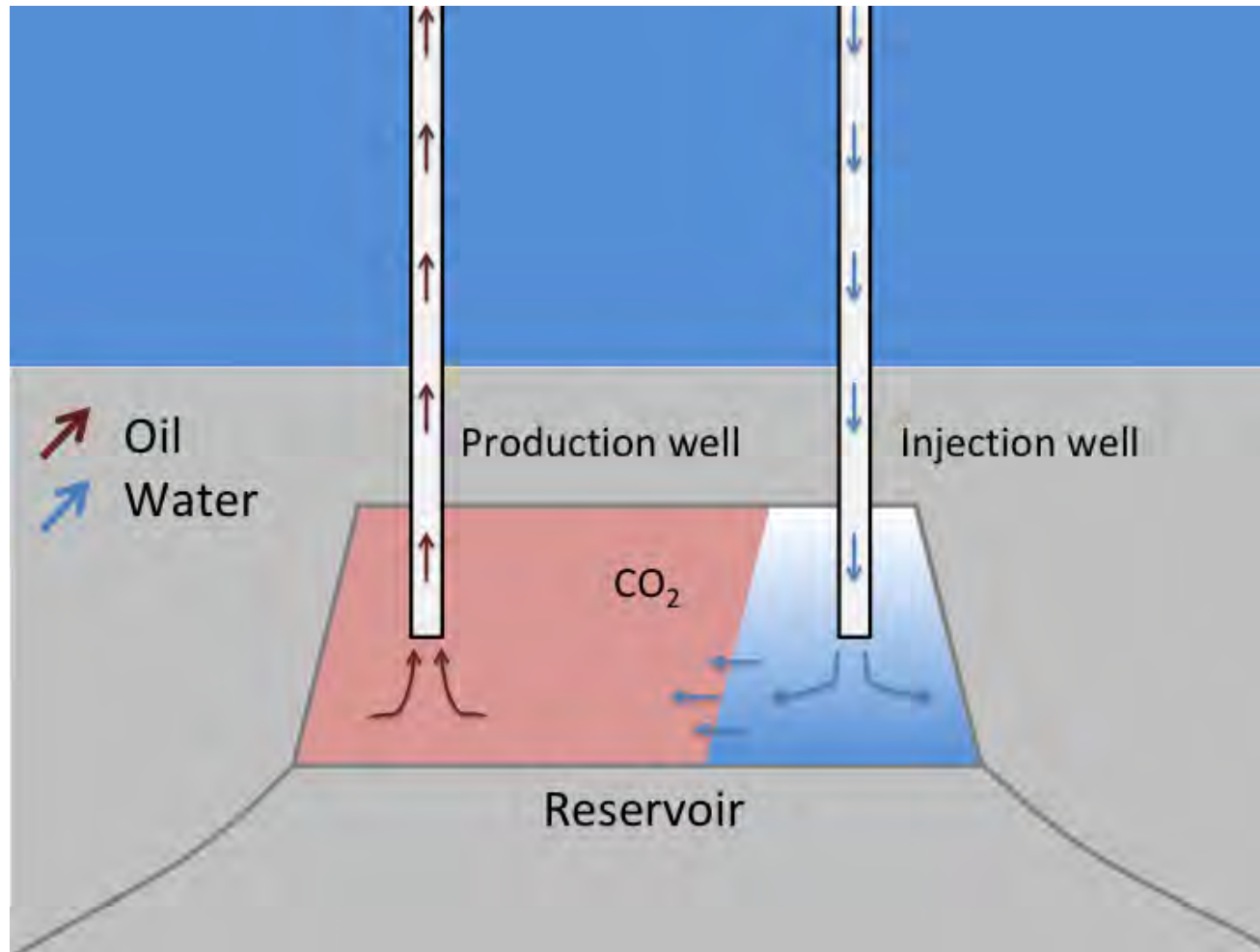


# Agenda

- Korrosion og korrosionshæmmere i Olie & Gas produktion
- Målsætning og metodologi for projektet
- Resultater og fortolkning
  - Inhibitor mekanisme
  - Ionforurening
- Sammenfatning



# Korrosion i Olie & Gas produktionen



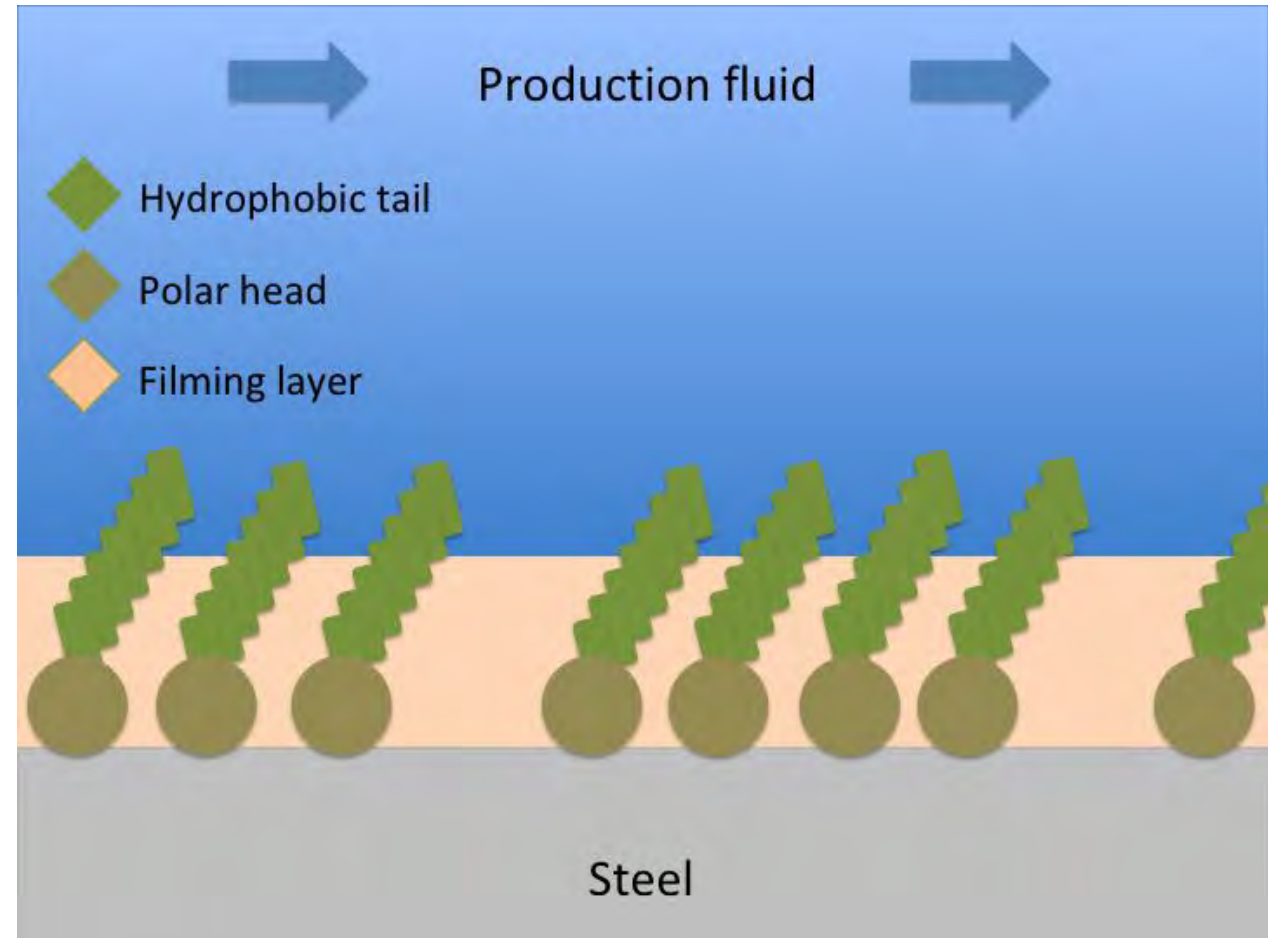




# Korrosionshæmmere

## Inhibitor klassifikation

- Anodisk
- Katodisk
- Gasfase
- Mixed/Organisk





# Målsætning

1

Mekanisme af inhibitor

2

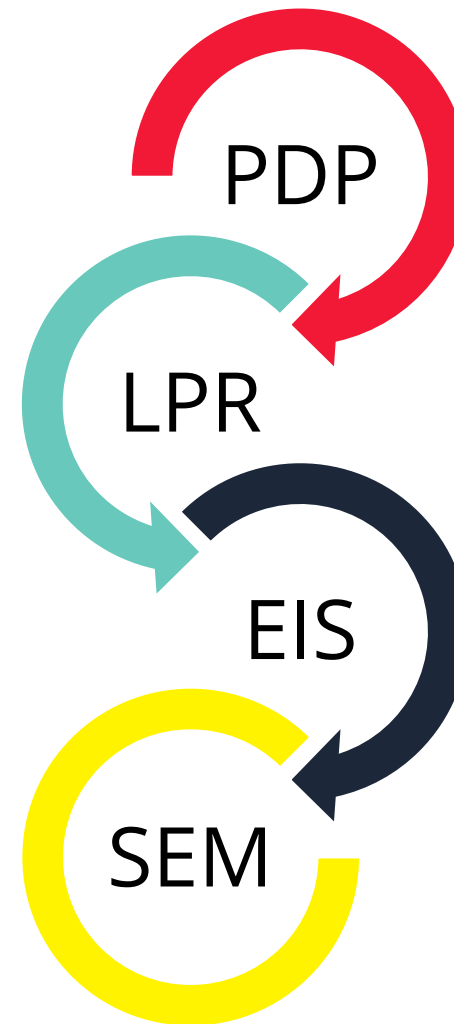
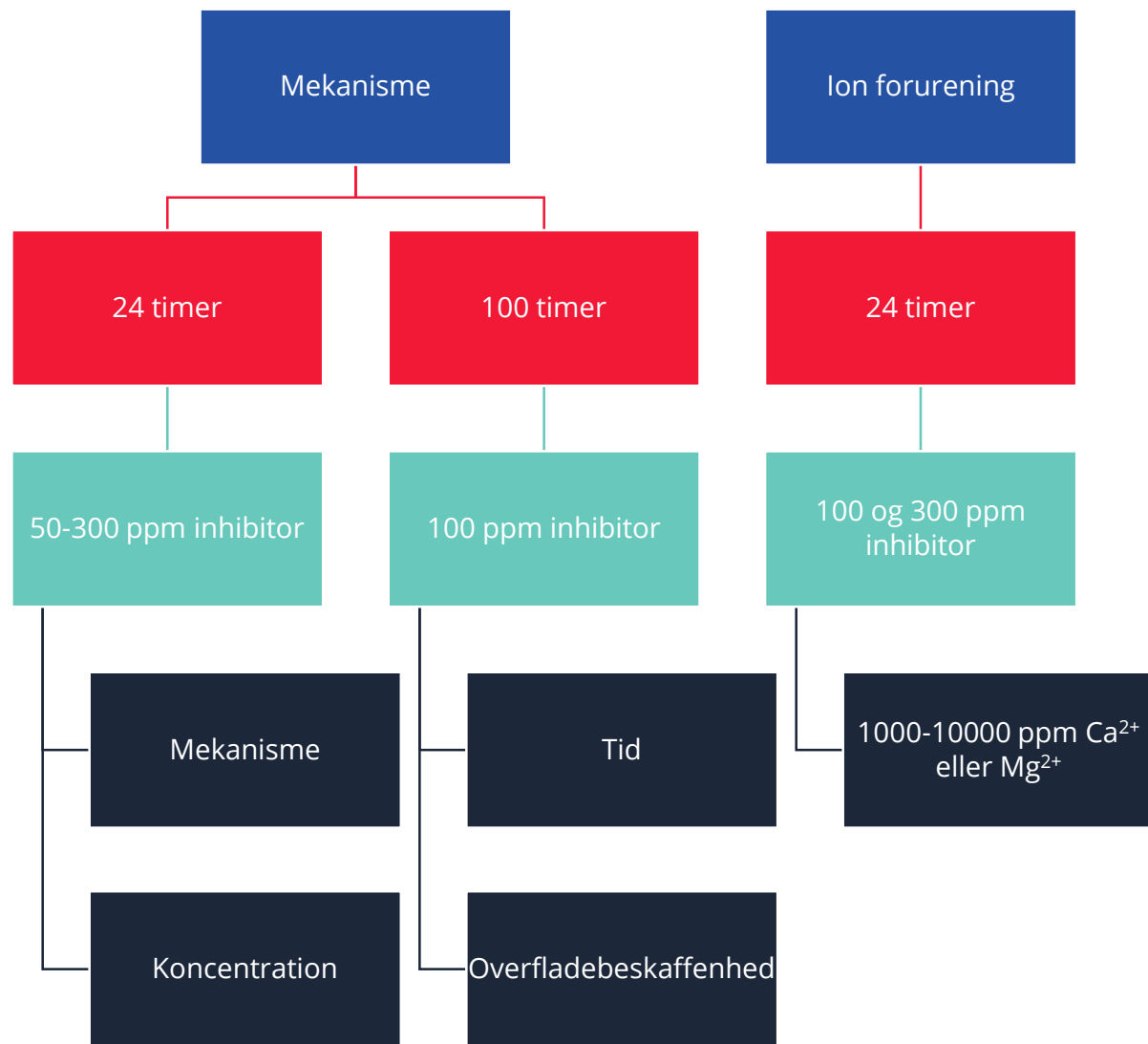
Betydning af koncentration, tid og overfladebeskaffenhed

3

Indflydelse af  $Mg^{2+}$  and  $Ca^{2+}$

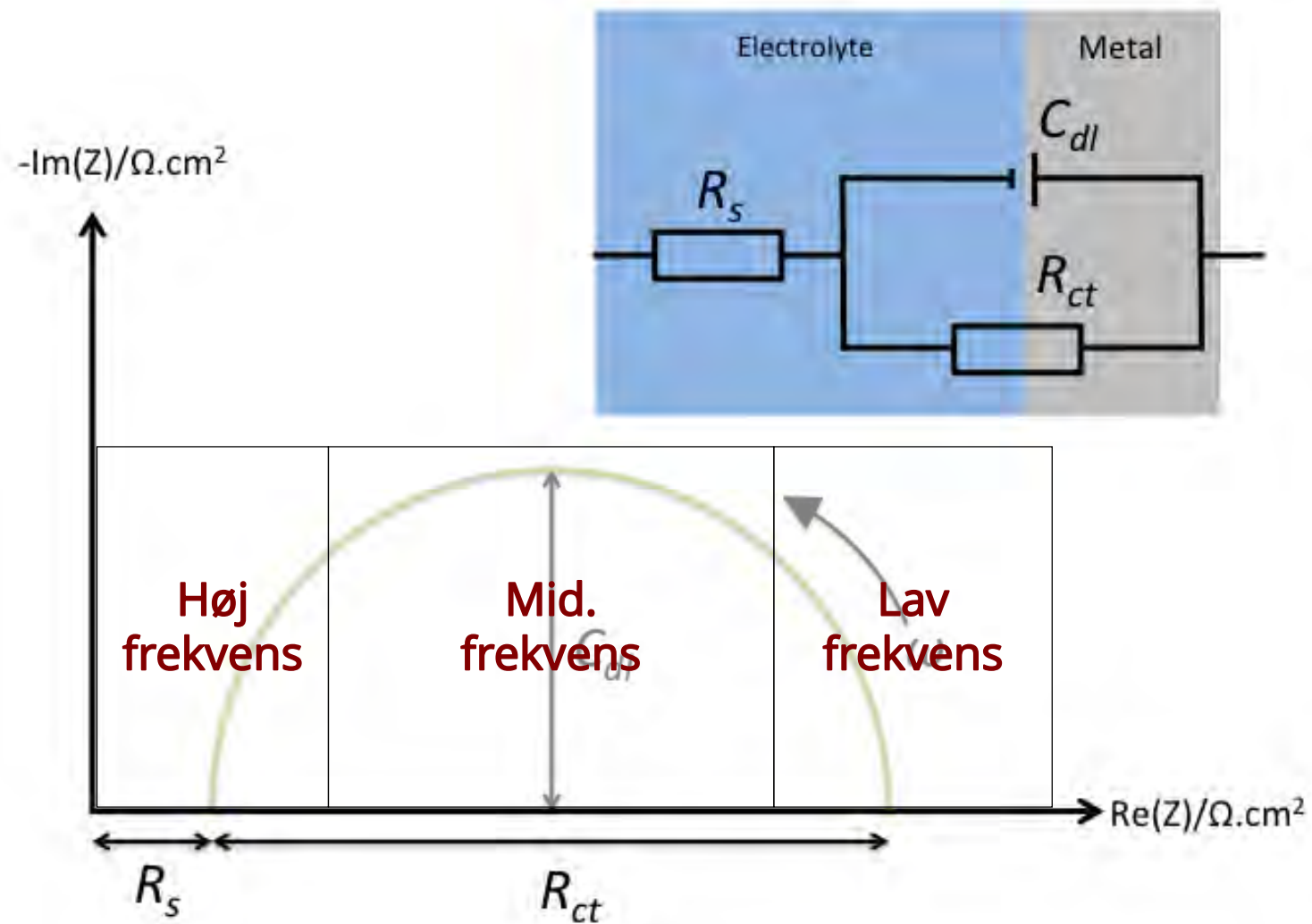


# Eksperimenter og metodologi



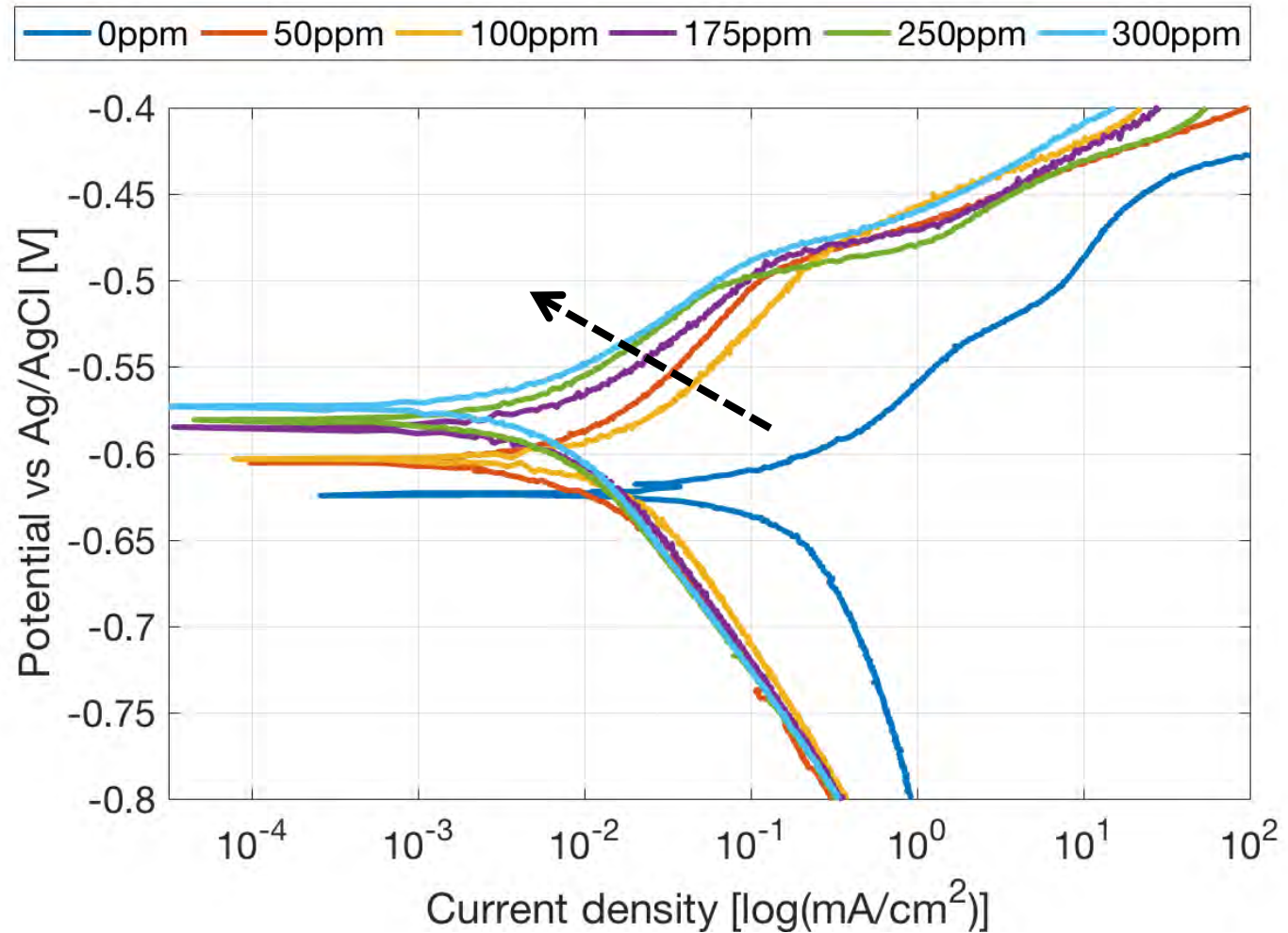


# Nyquist diagram (EIS)





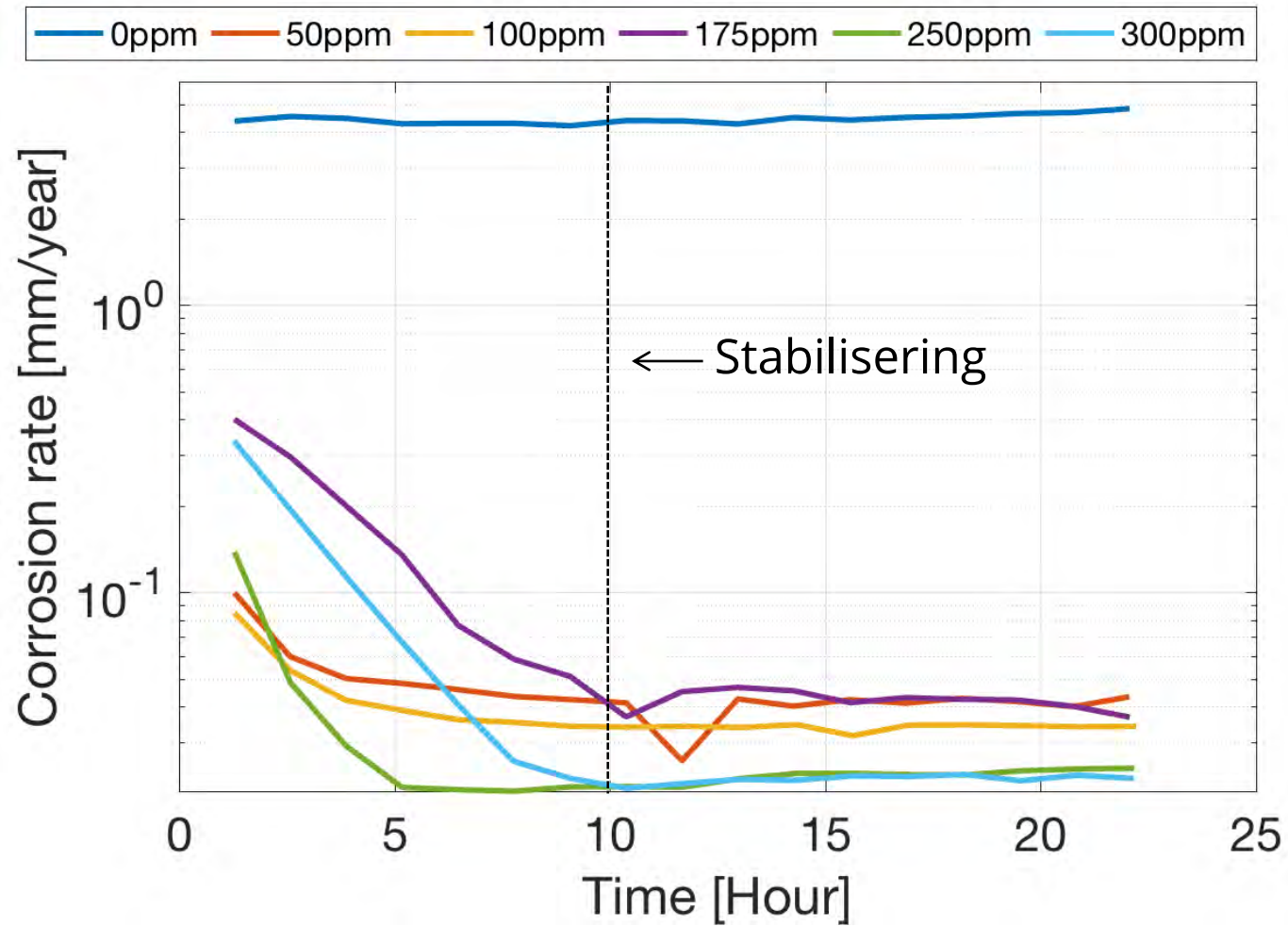
# 24 timer - polarisering





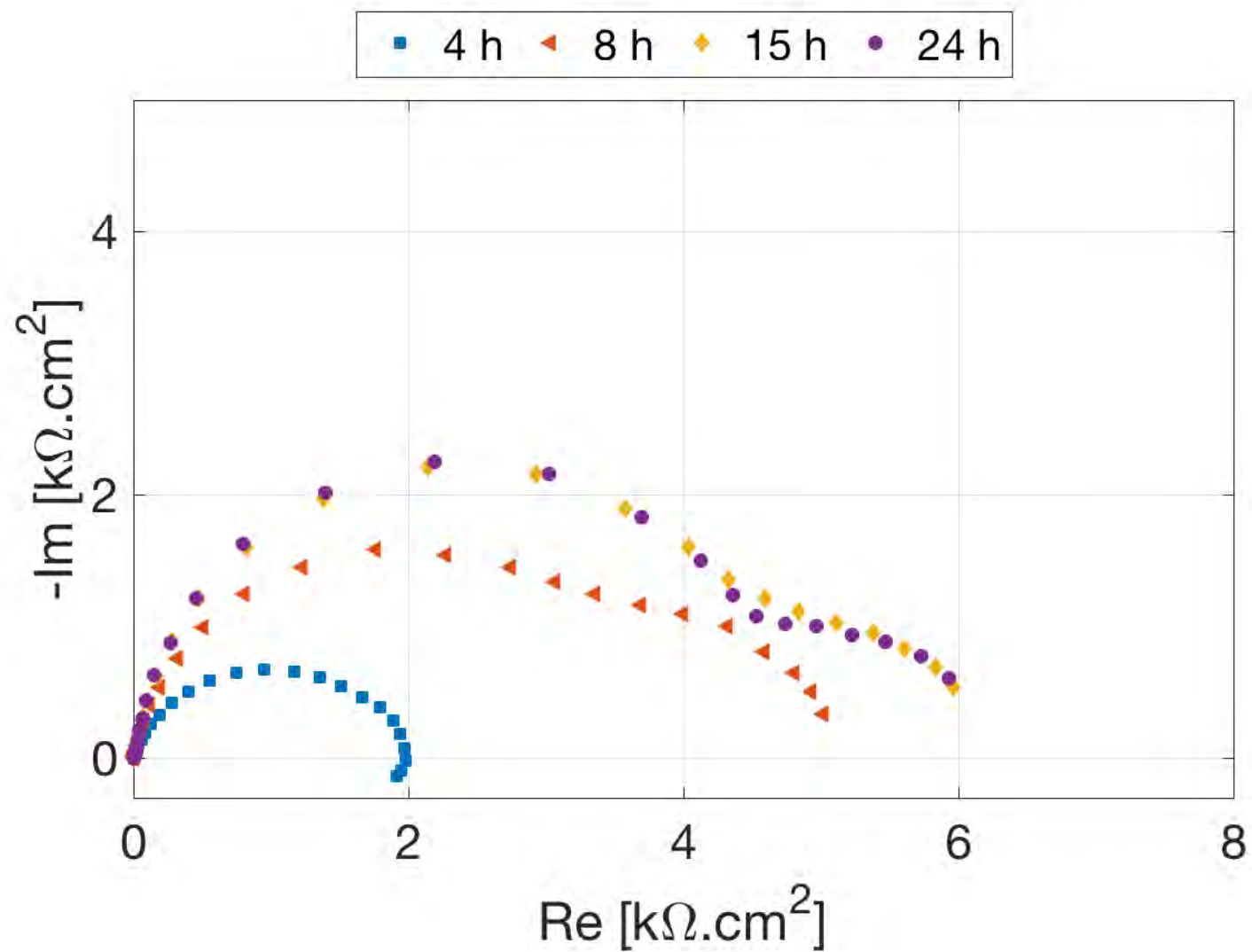


# 24 timer - korrosionshastighed





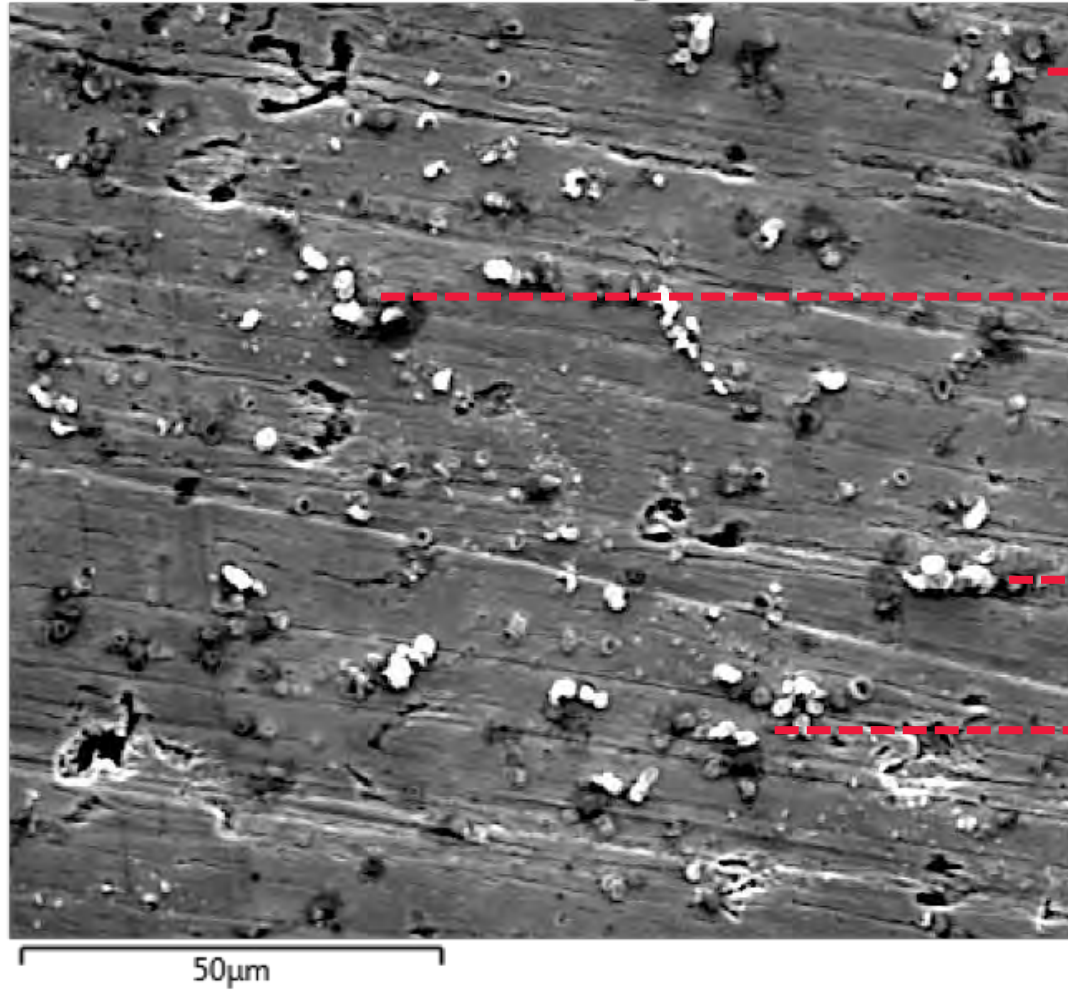
# 24 timer - EIS



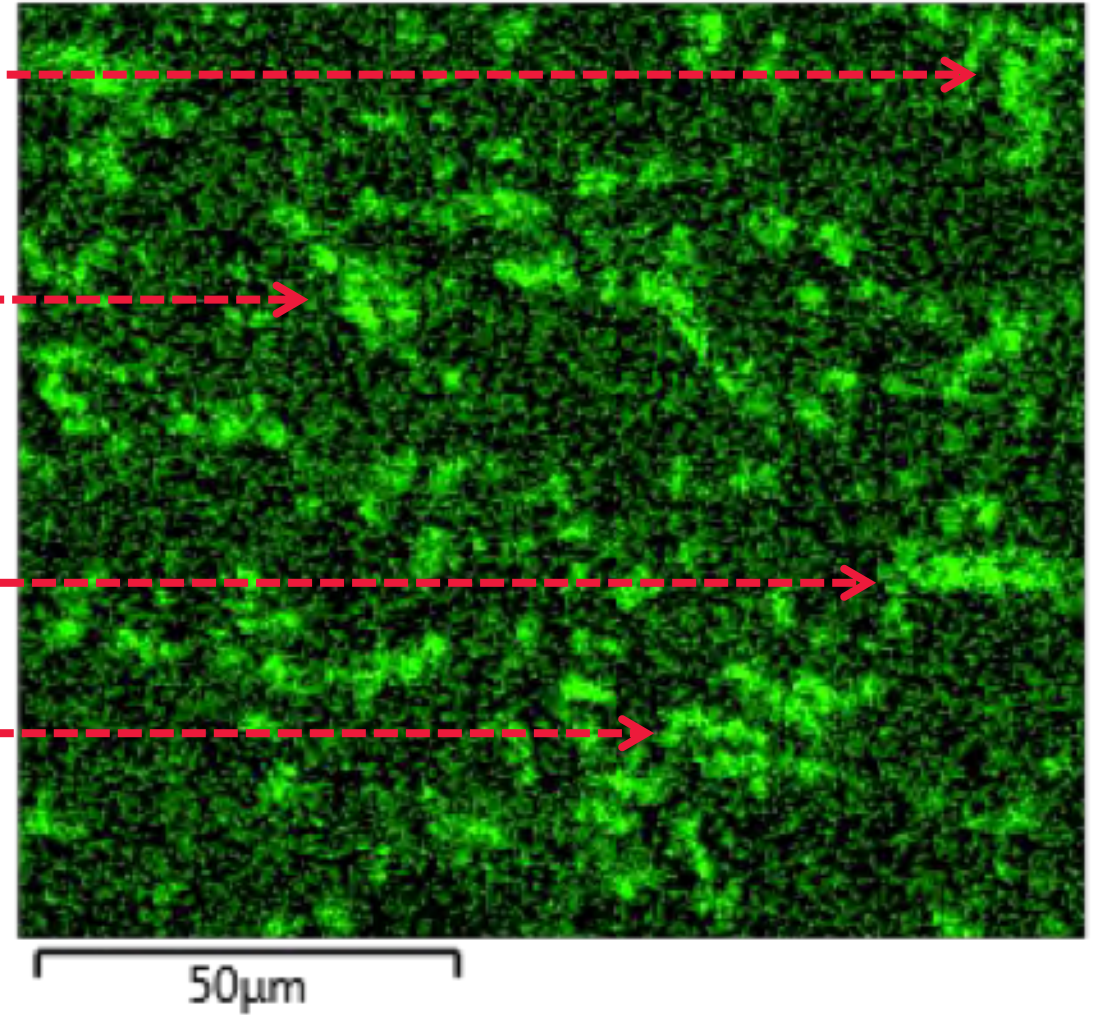


# 24 timer – SEM/EDS

Electron Image

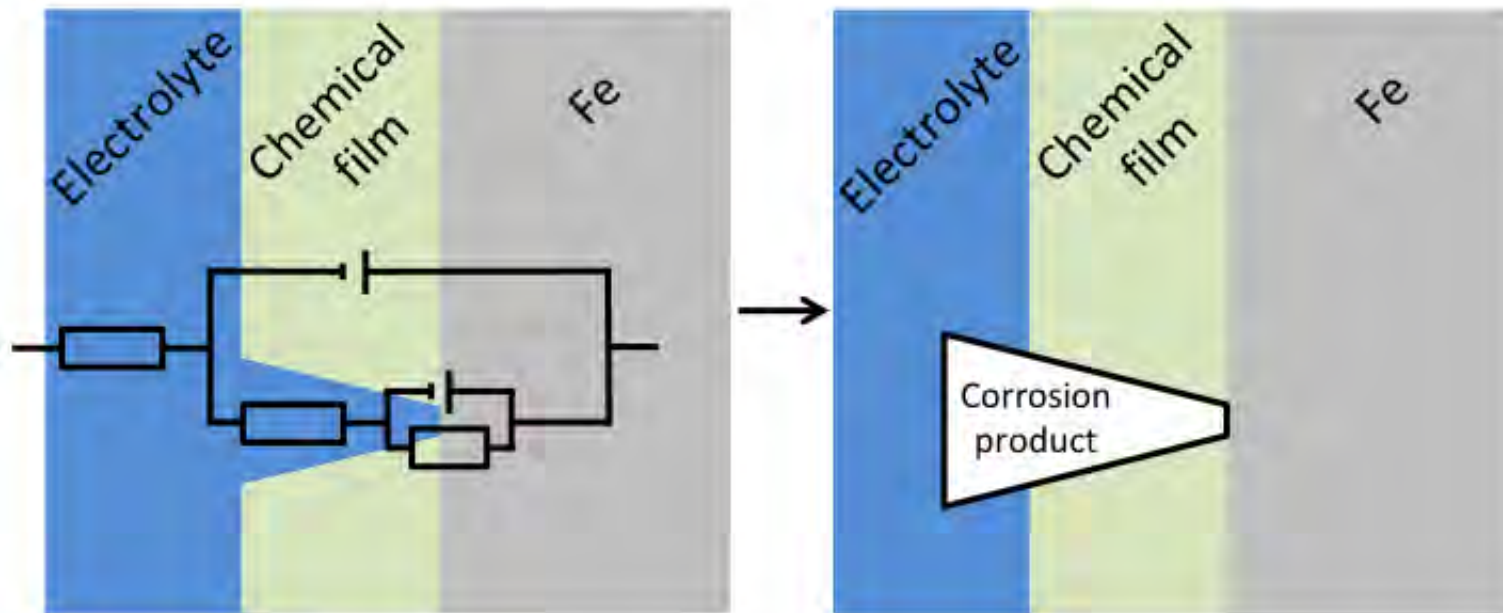
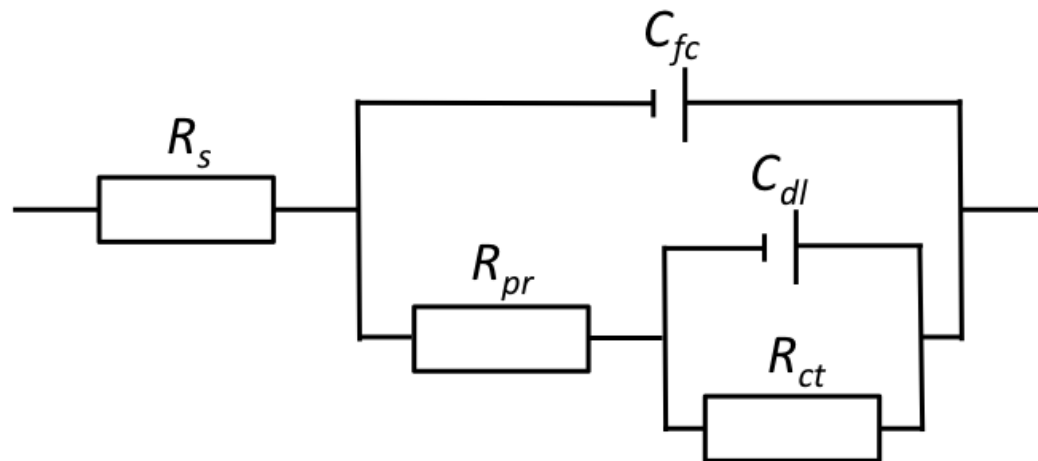


O Kα1





# Ækvivalent elektrisk system

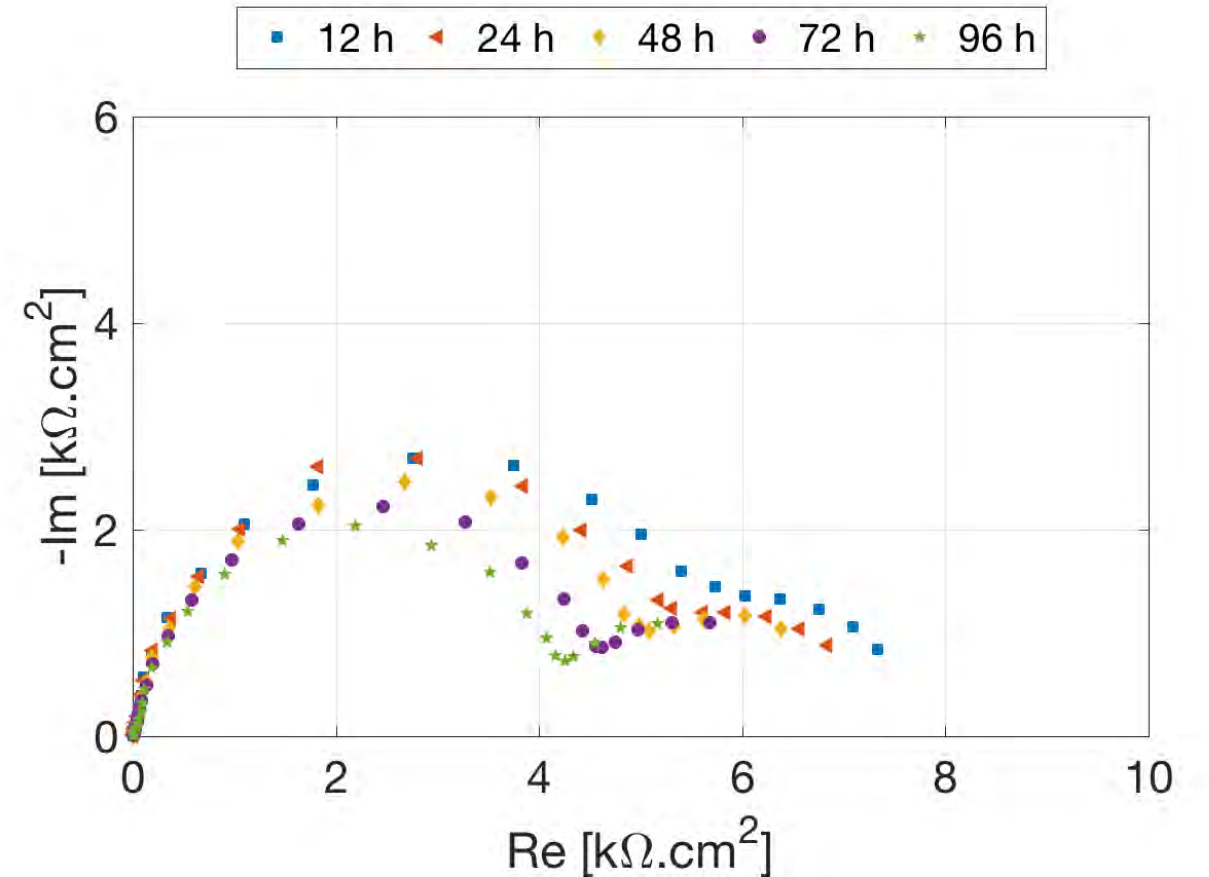
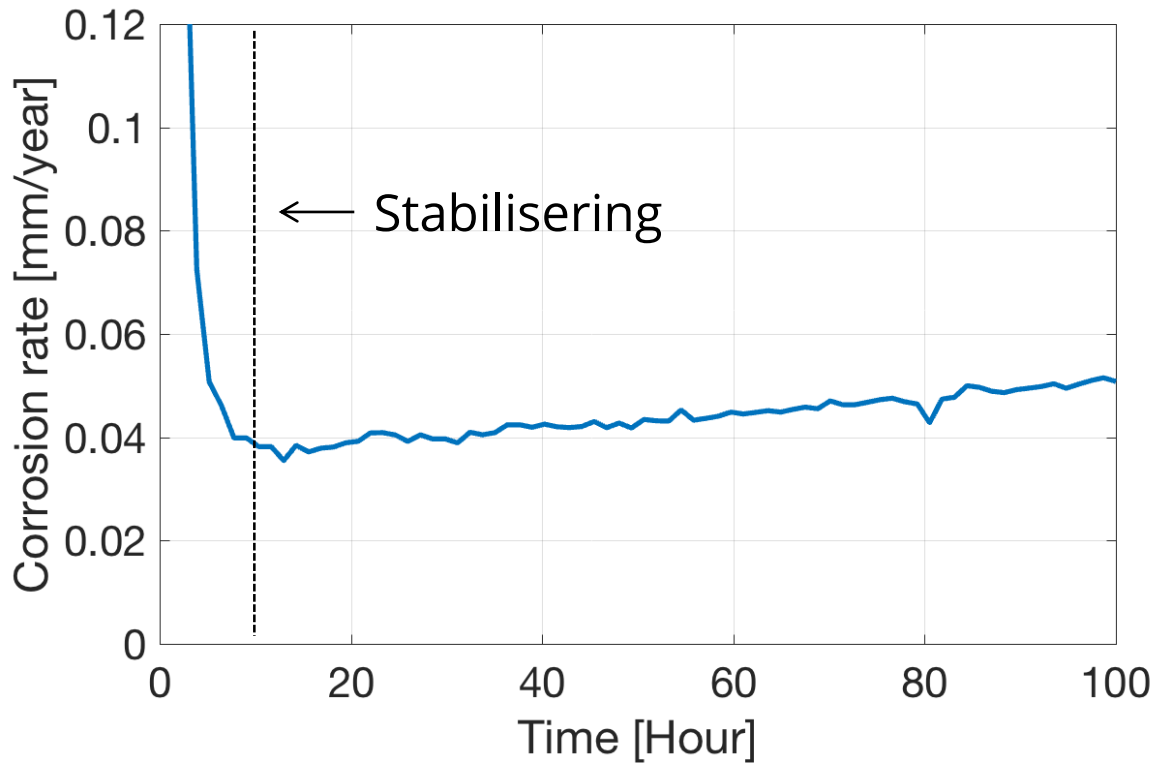






# 100 timer - tid

100 ppm inhibitor

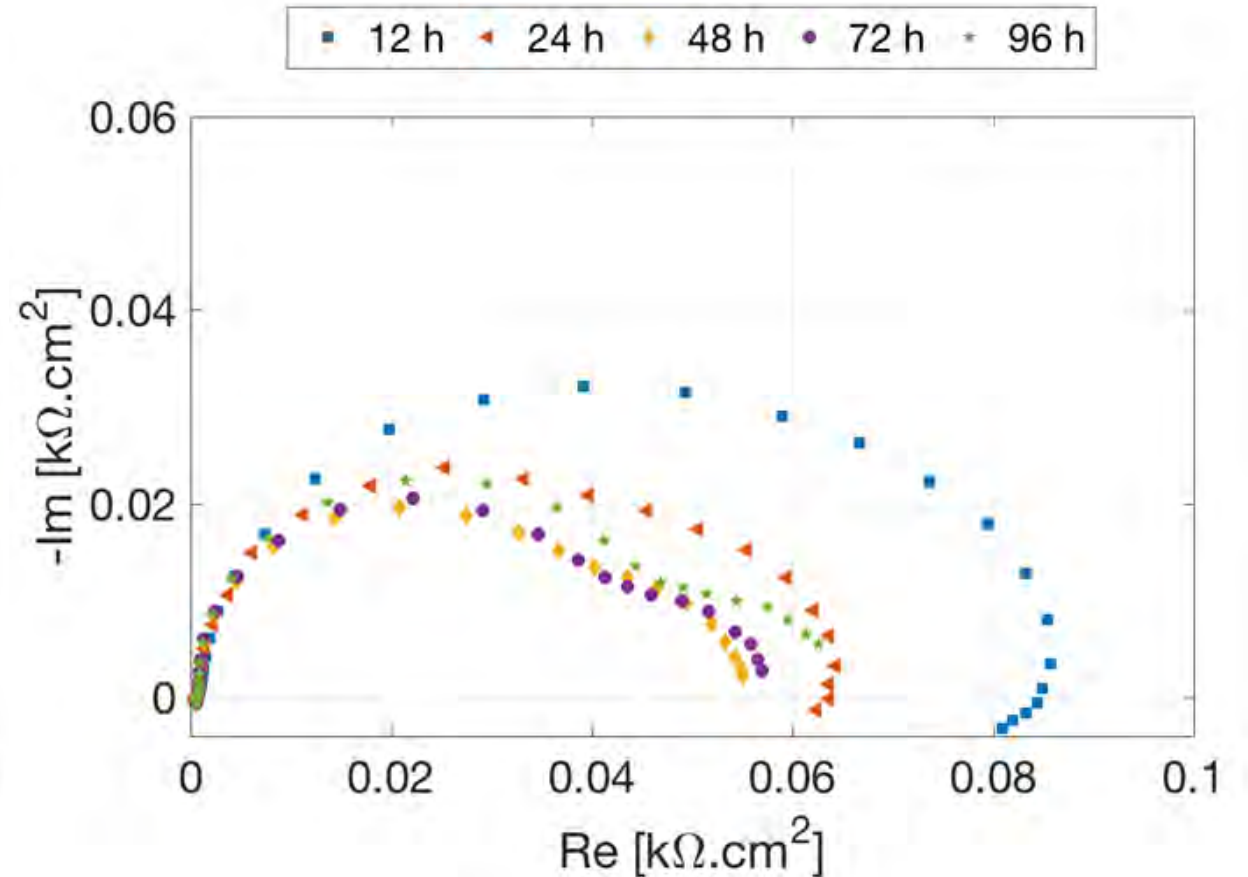
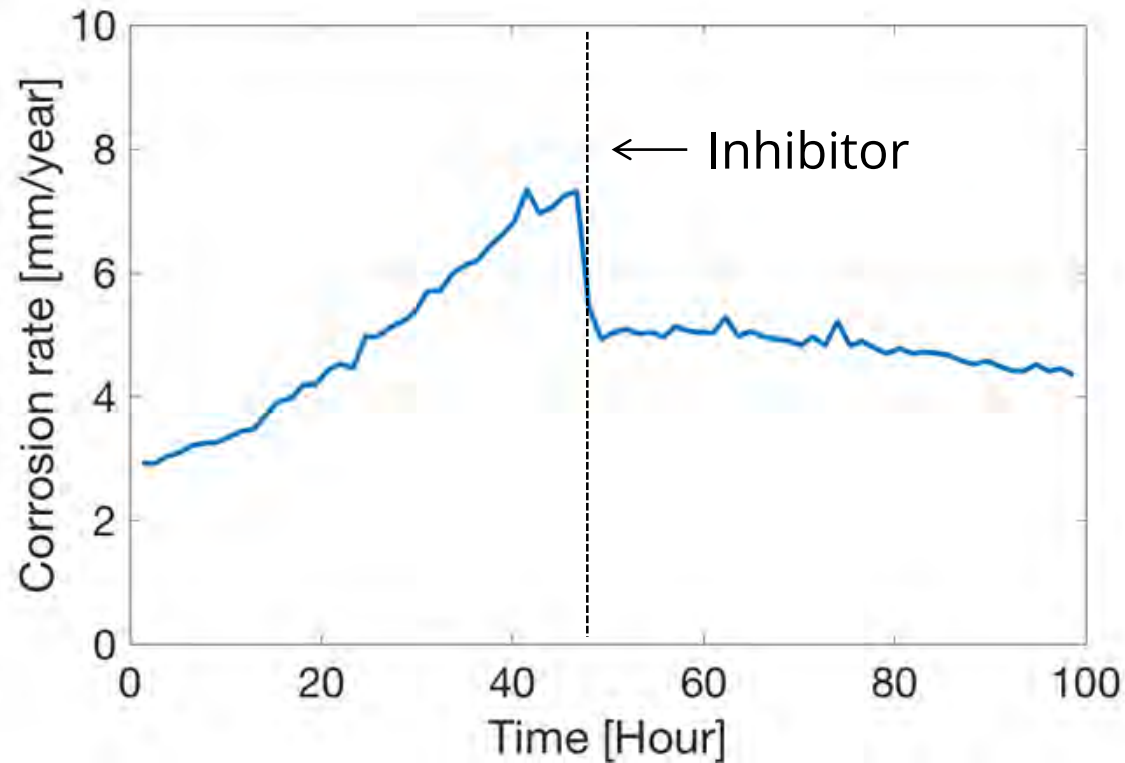






# 100 timer - overfladebeskaffende

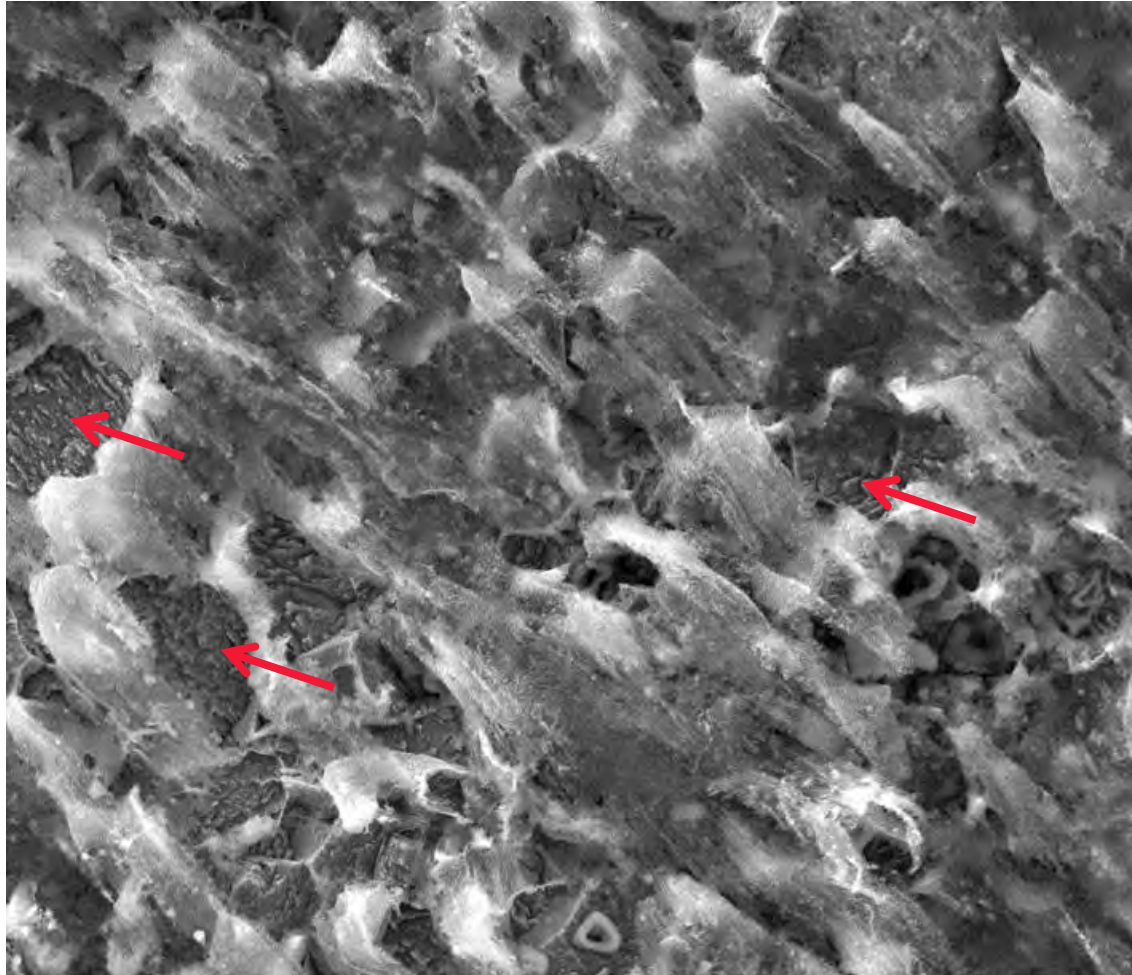
100 ppm inhibitor





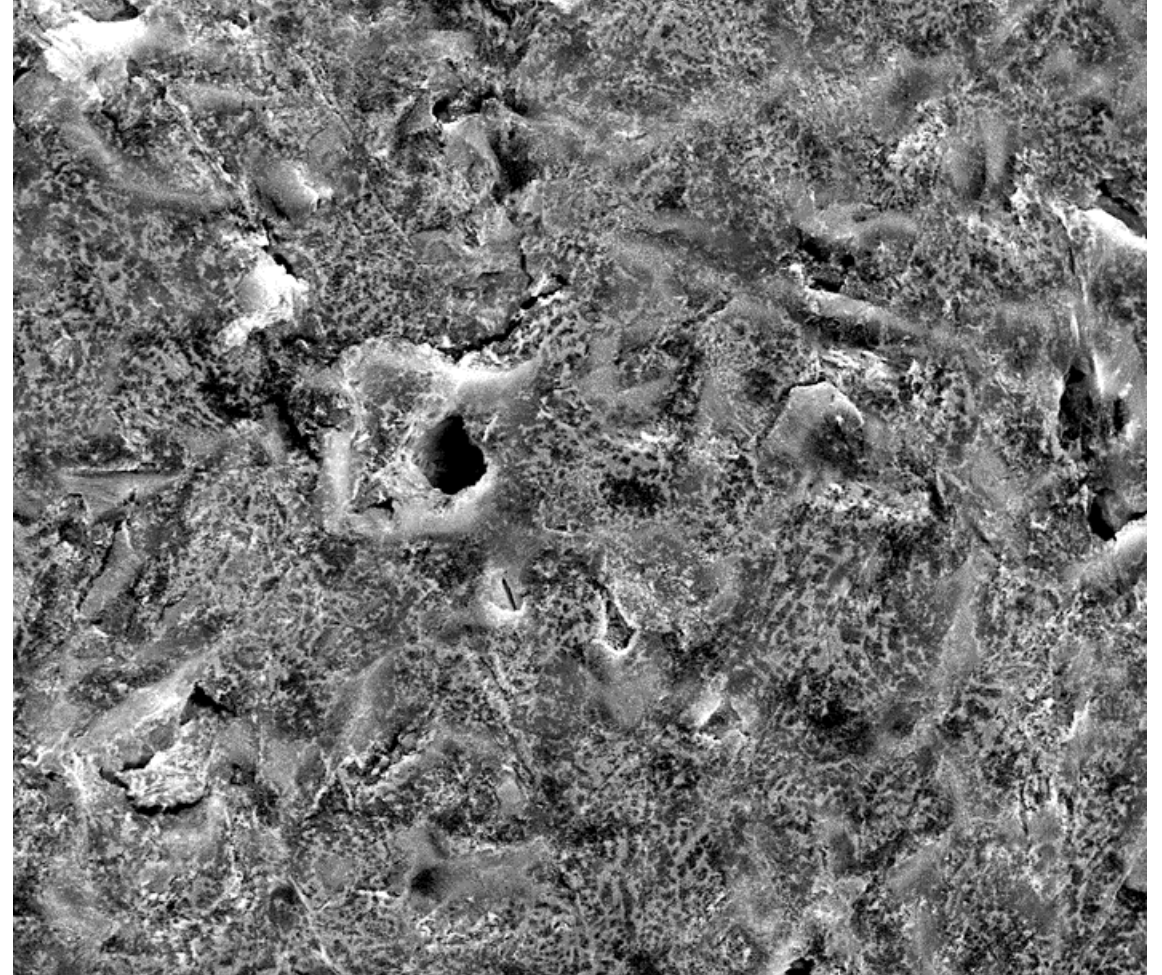
# 100 timer - SEM

Fri korrosion



mode	HV	WD	mag	spot	50 µm
SE	20.00 kV	8.0 mm	2 000 x	5.0	0 ppm

Korrosionshæmmer



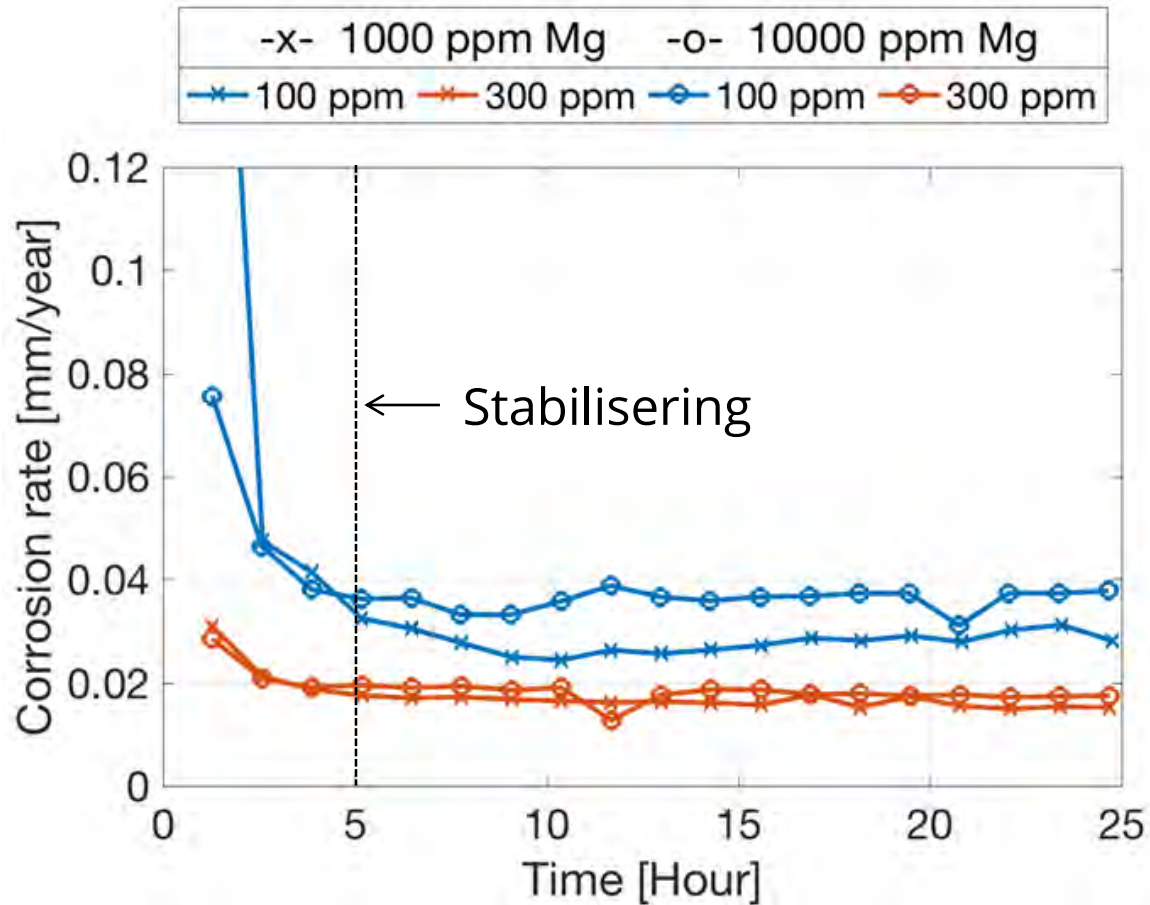
det	HV	WD	spot	mag	50 µm
ETD	15.00 kV	7.1 mm	3.5	2 000 x	48/52 hours, 100 ppm inhibitor



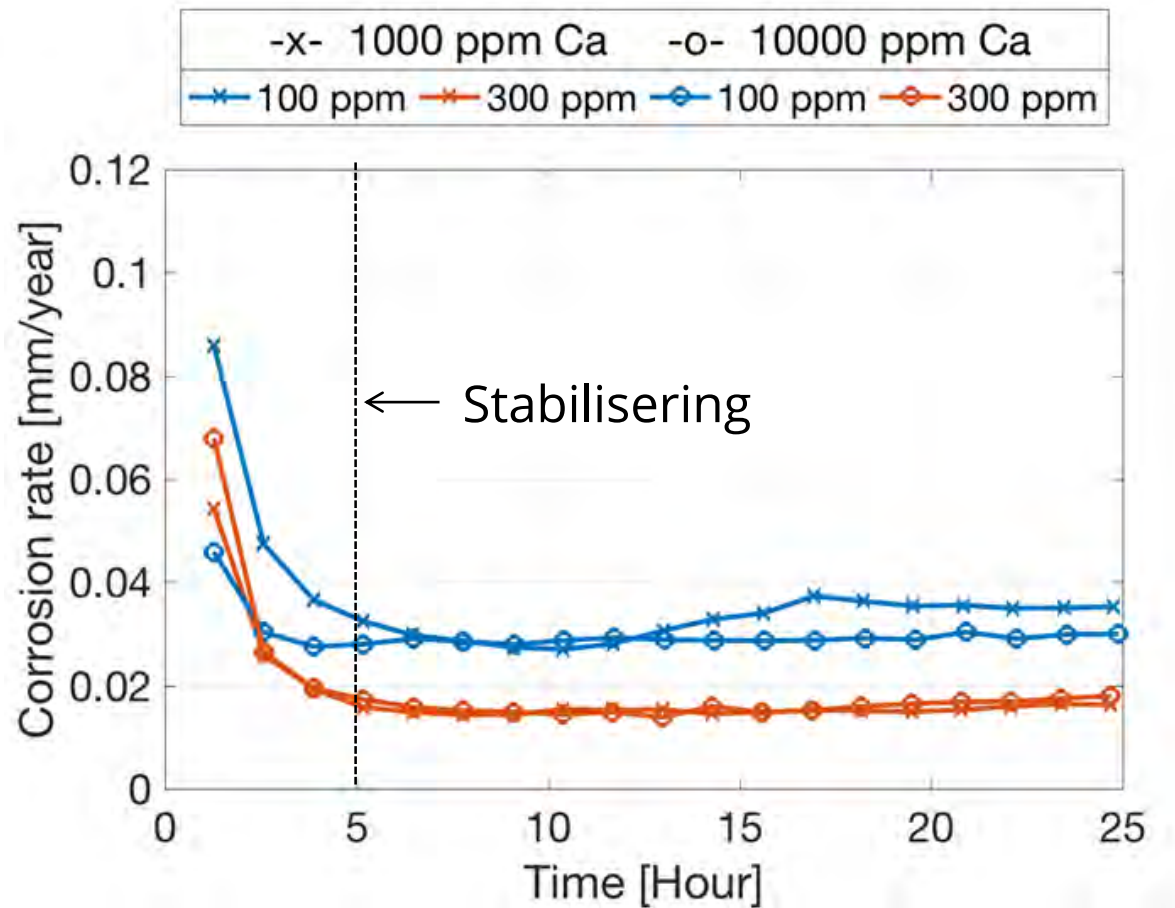


# Ionforurening - korrosionshastighed

## Magnesium



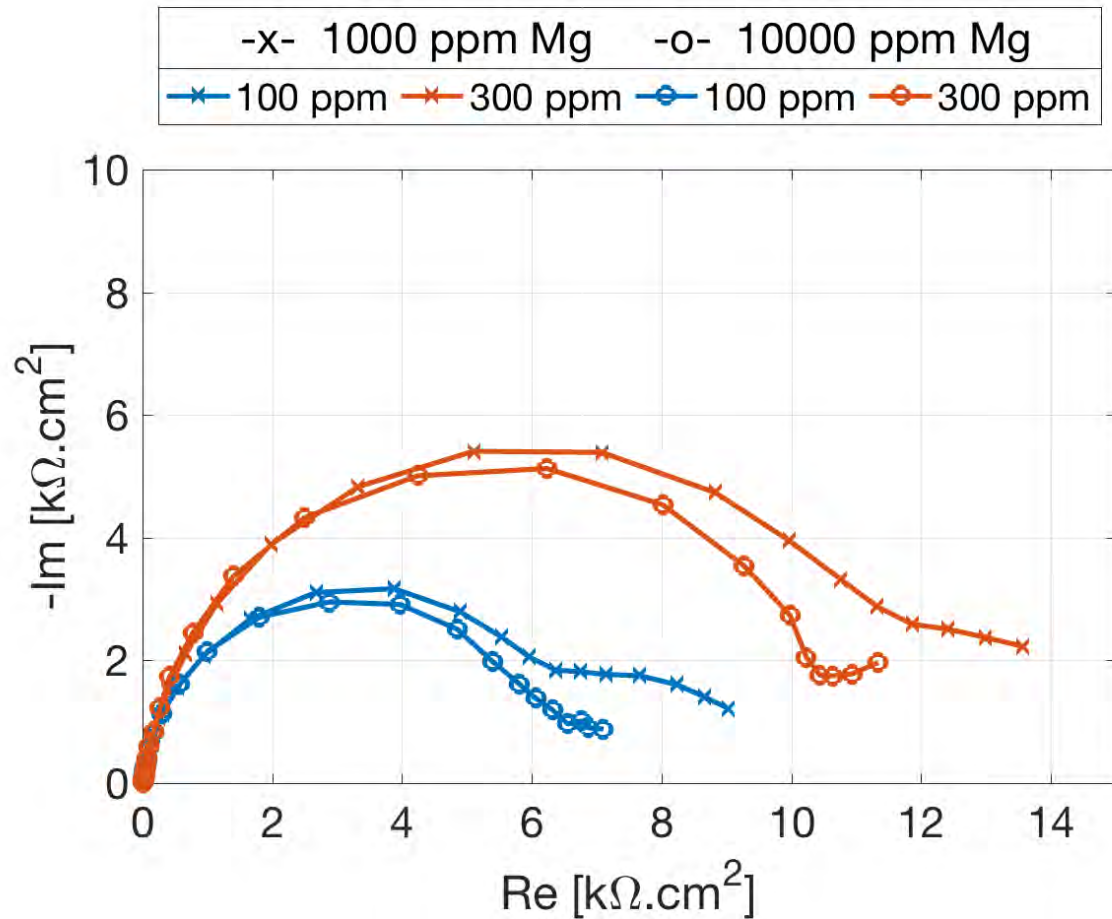
## Calcium



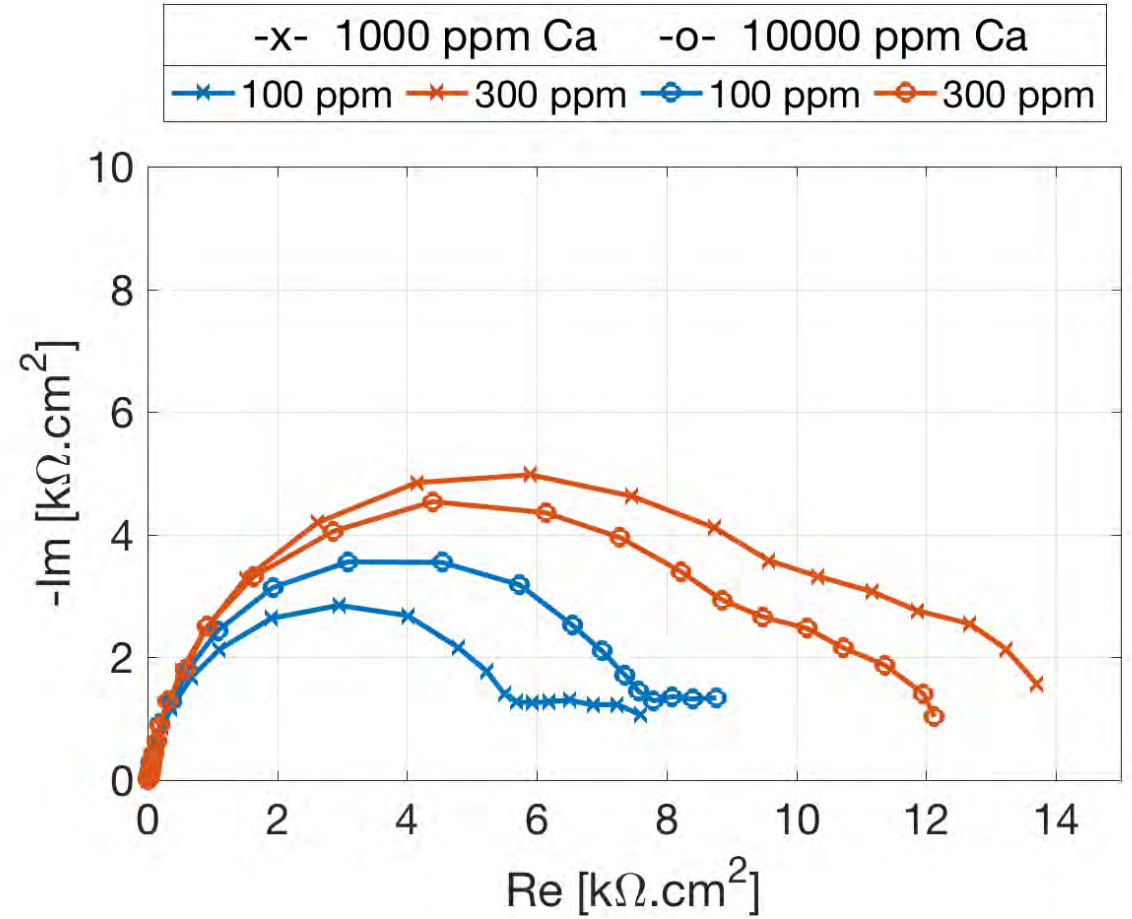


# Ionforurening - EIS

## Magnesium



## Calcium





# Resumé

1. Organisk hæmmer med anodisk/katodisk filmformene mekanisme
  - Op til 10 timers inkubationstid
  - Porrer og overfladefejl
2. Korrosionshastighed uafhængig og koncentration
3. Nedbrydning af film over tid
4. Overfladebeskaffenhed
5. Beskyttelse uafhængig af  $Mg^{2+}$  og  $Ca^{2+}$ 
  - Lavere inkubationstid





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# Tak for opmærksomheden

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Reasearcher Magdalena Rogowska