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 Thèse, 2017– 2020  
 MATEIS (Bernard Normand, Sabrina Marcelin)  
 IP2I (Nathalie Moncoffre, Nicolas Béreud)

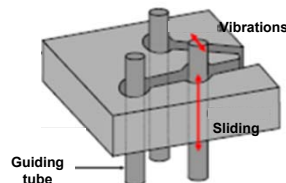
# Tribocorrosion under irradiations of a 316L stainless steel



Equipes: Corris (MATEIS) ; ACE (IP2I)

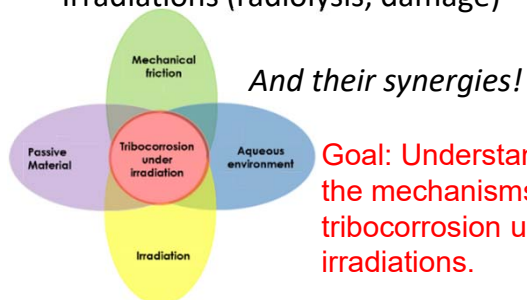
## Context

- In PWR control rod guidance assemblies (CRGAs) made of 316L steel are subject to wear



Control rods guides

- Ageing due to combined effects
  - Mechanical (friction, vibrations, fretting)
  - Chemical (corrosion)
  - Irradiations (radiolysis, damage)



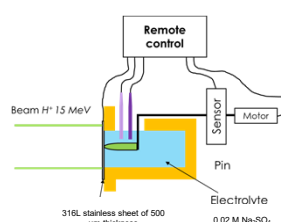
And their synergies!

Goal: Understanding the mechanisms of tribocorrosion under irradiations.

## Method and devices

- Lab-made tribocorrosimeter:

- Instrumented friction pin



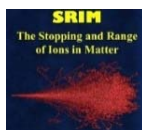
- Electrochemistry under irradiation:

- 3 Electrodes setup
- Electrochemical Impedance Spectroscopy
- Chronoamperometry
- Corrosion potential measurement
- Polarization curve

- Irradiation using 15 MeV H<sup>+</sup>

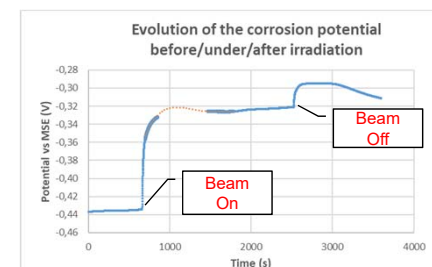
- cyclotron CEMHTI CNRS Orléans France

- Irradiations and radiolysis simulation:



## Results

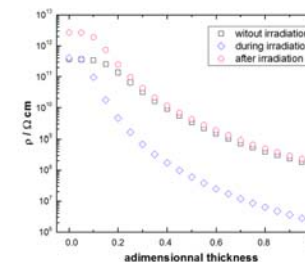
- Effect of radiolysis on the OCP



Control of the corrosion potential by the irradiations with rapid kinetics

Evolution of the corrosion potential before/during and after irradiation

- Different states of resistivity though passive film (before, during, after) irradiations



No change in terms of nature of the passive film but evolutions of the physical properties