

Technological infrastructure for materials characterization at CIEMAT

Sites at CIEMAT



Division of Materials for Engineering

Mechanical Properties Laboratory

Microstructure Laboratory

Corrosion Laboratory

Radioactive Laboratory

Division of Electrical Engineering

Applied Superconductivity
Laboratory

Sites at CIEMAT



Materials Division

Mechanical Properties Laboratory

Microstructure Laboratory

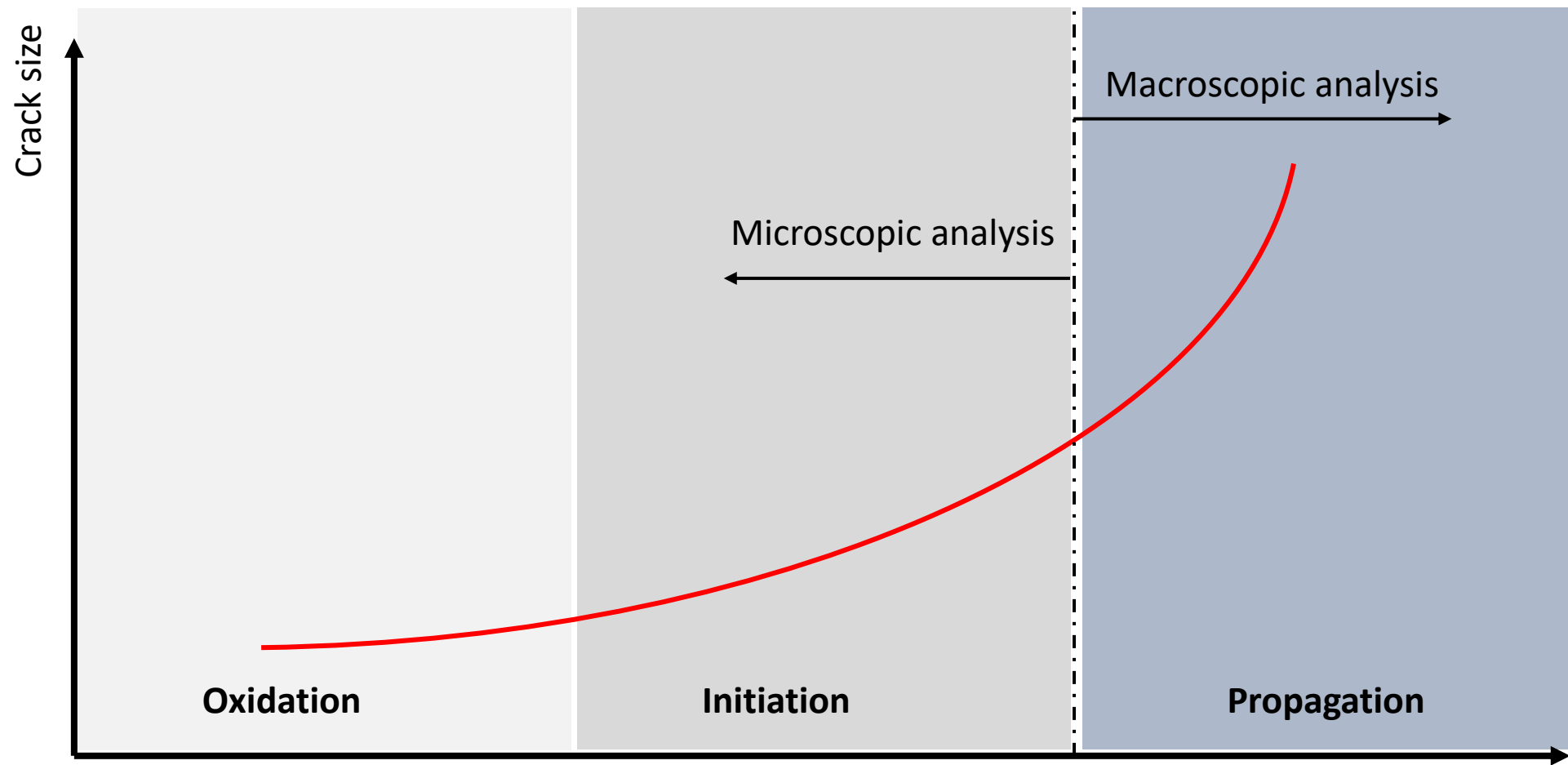
Corrosion Laboratory

Radioactive Laboratory

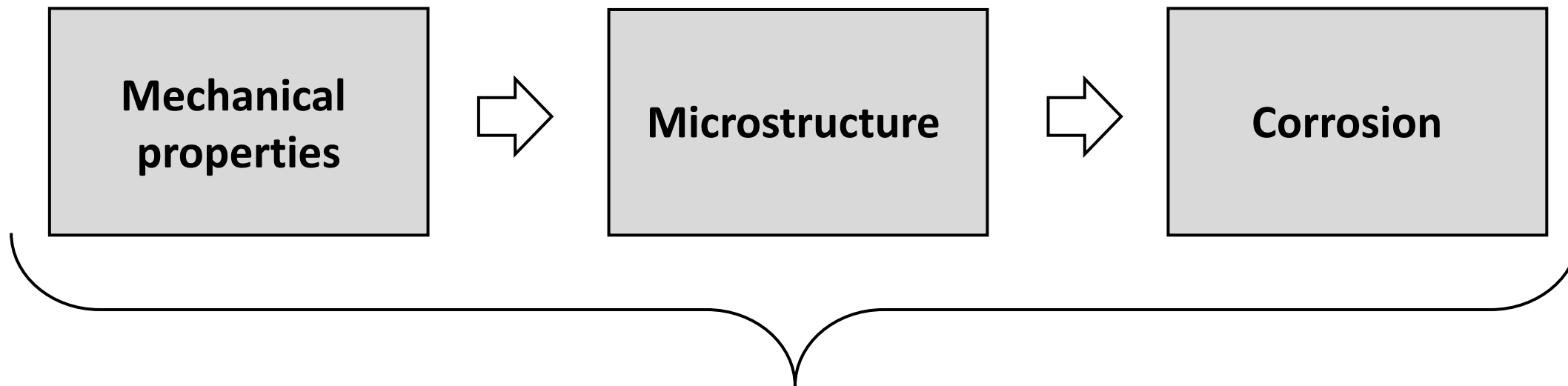


CIEMAT - Bldg. 31
Av. Complutense, 40,
28040 Madrid,
SPAIN

Stress Corrosion Cracking (SCC)



Stress Corrosion Cracking (SCC) - Characterization



Understanding of all that is necessary to estimate materials and components lifespan

90% of activities at CIEMAT are focused on the support for new materials development

Stress Corrosion Cracking (SCC) - Characterization



Mechanical Properties Laboratory

Creep test

Small Punch test

IR09

Small Punch Creep test

Tensile, Toughness, Fatigue, Crack growth Test

Impact Test

Vicker Hardness Test

Nanoindentation Test

Metrology

Temperature Range:

-160°C -> **1000°C**

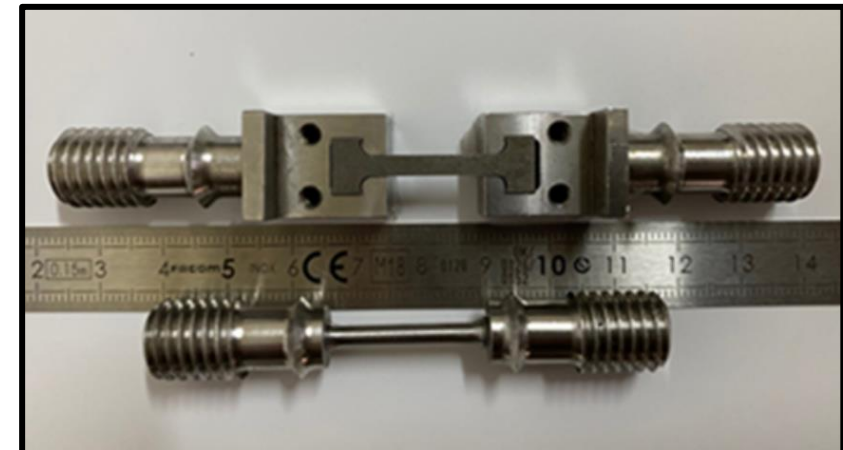
Specialization in small samples

Screening method

Resolution in:

-Scale

-Cristallographic orientation



Stress Corrosion Cracking (SCC) - Characterization



Microstructure Laboratory

Spectroscopy

XPS
Auger

Microscopy

SEM
FEG-SEM

TEM – Only installation in Spain

IR09

Near Future: High Resolution TEM

Resolution Range:

Optic -> SEM (nm)

XPS -> In Situ Ion Etching

Auger -> In Situ Breakage

Structural and Chemical analysis
before oxidation

Stress Corrosion Cracking (SCC) - Characterization



Microstructure Laboratory



XPS



Auger



FEG-SEM



TEM

Stress Corrosion Cracking (SCC) - Characterization



Corrosion Laboratory

Dynamic regime Stress Corrosion Cracking (SCC) tests:

Light water reactor (LWR) conditions

Boiling Water Reactor (BWR) conditions (HALDEN)

Supercritical water for IV generation reactors

IR09

Temperature Range:

RT -> 700°C

Static Autoclaves for corrosión and initiation tests in aggressive environments:

Acidic PH

Basic PH

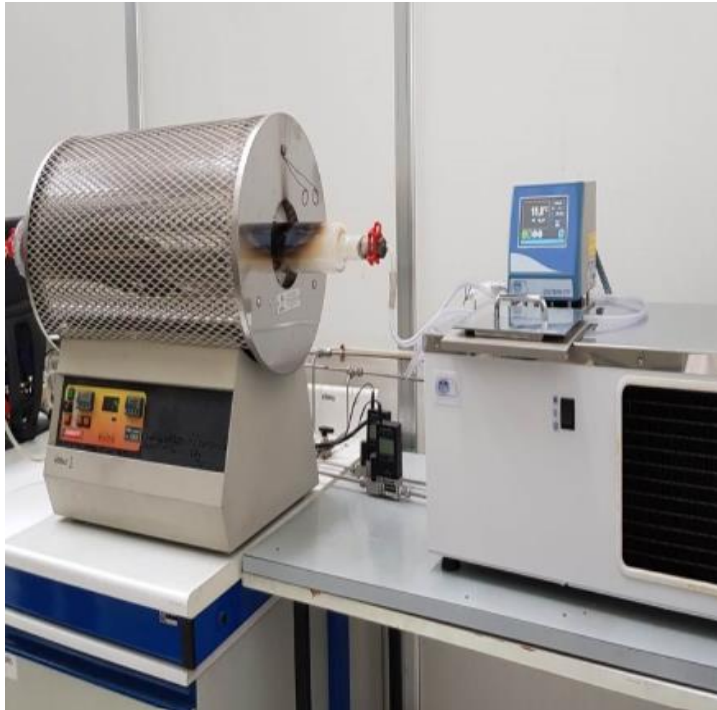
Molten salt – Controlled gas atmosphere

Liquid metal: Pb – Bi -> Creep test

Stress Corrosion Cracking (SCC) - Characterization



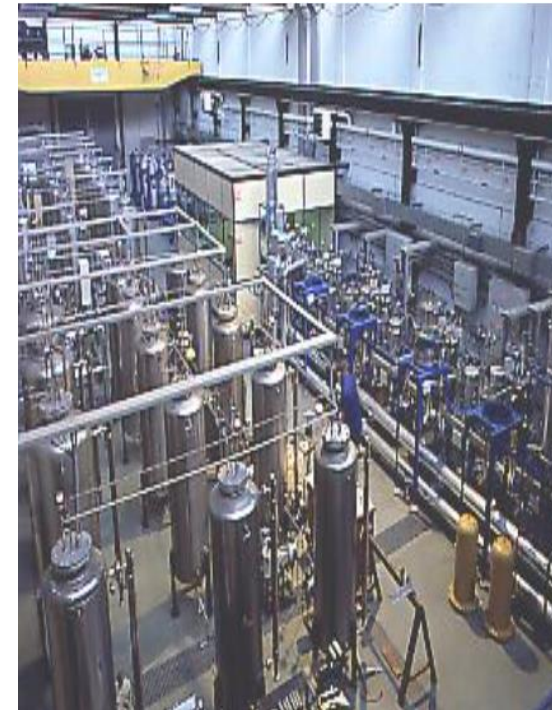
Corrosion Laboratory



Liquid Metal



Molten Salt



Light Water



Irradiated Samples

Radioactive Laboratory - NAYADE



Pool type installation – Shielding 100000 Ci of Cobalt-60

IR06

Size: 1.2 m side X 4.5 m Depth

Applications:

Electronics for aerospace industry

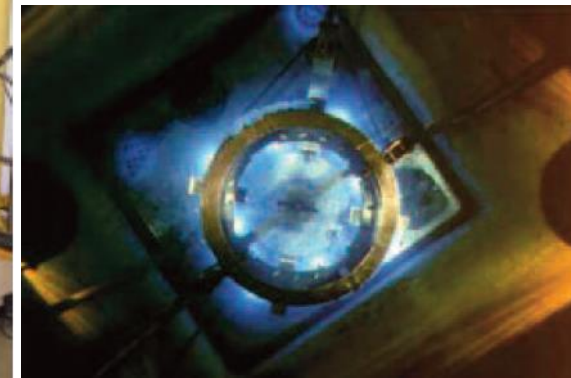
Study of accelerated aging of materials in nuclear industry

Genetics, food preservation and microbiological sterilization

Irradiation of gemological materials

Dose Range:

9 Gy/h -> 50 kGy/h



Sites at CIEMAT



Division of Electrical Engineering

Applied Superconductivity
Laboratory

CEDEX
C\ Julián Camarillo 30, 28037
Madrid,
SPAIN

Applied superconductivity lab

Two Cryostats for testing of superconducting magnets at 77K & 4.2K



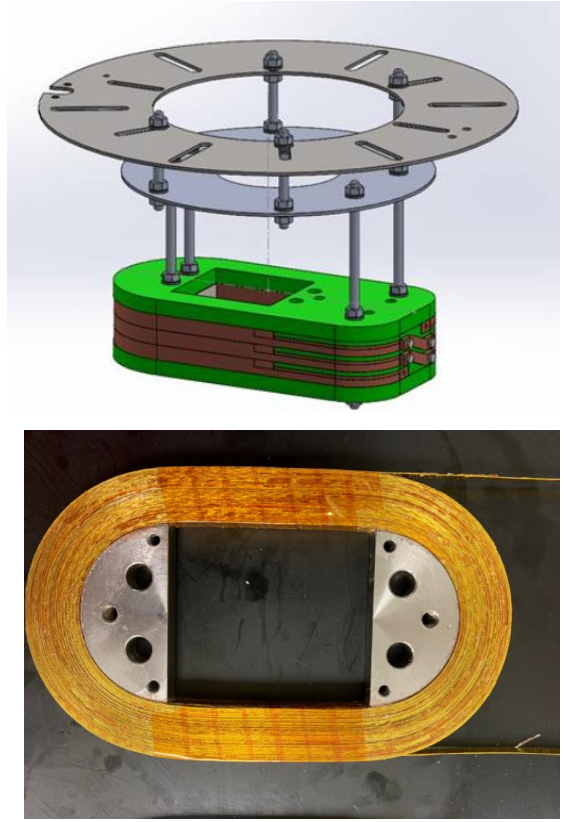
GMM Cryocooler for superconducting magnets testing at variable temperature $T \geq 10$ K



Applied superconductivity lab



Low Temperature Superconductor (LTS) magnet at cryostat insert



High Temperature Superconductor (HTS) coil before assembly onto cryostat insert



Thank you