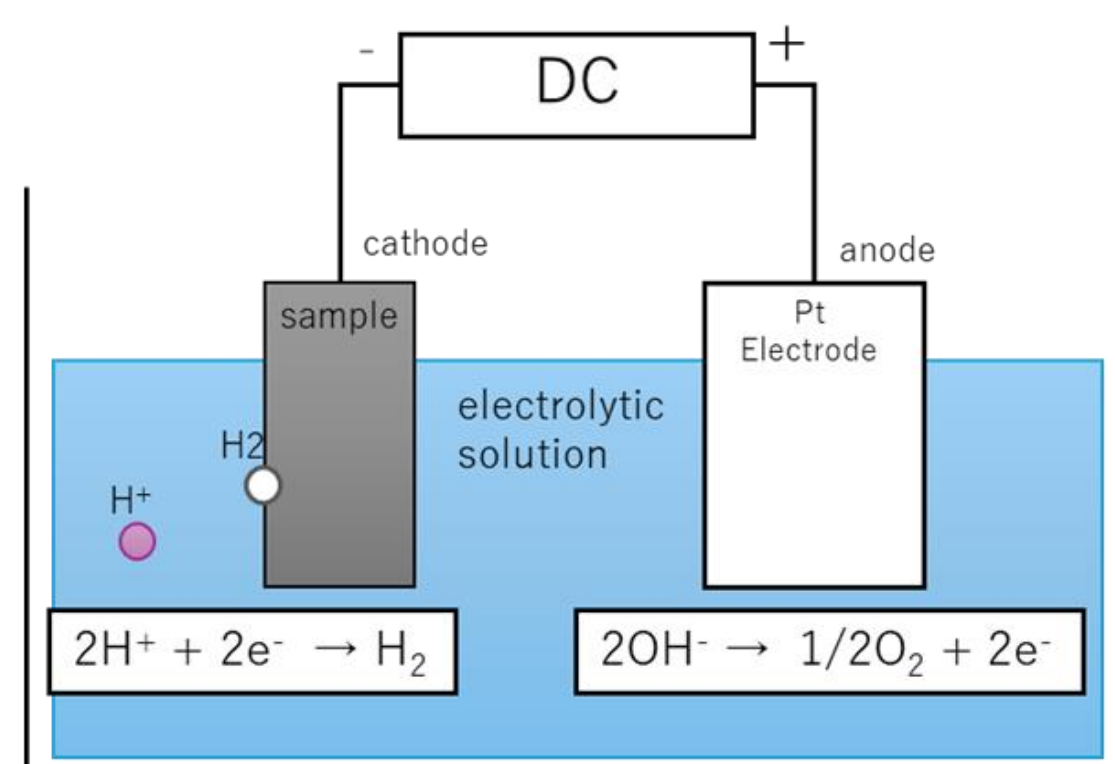


# Establishment of evaluation method for hydrogen environment compatibility of metal materials

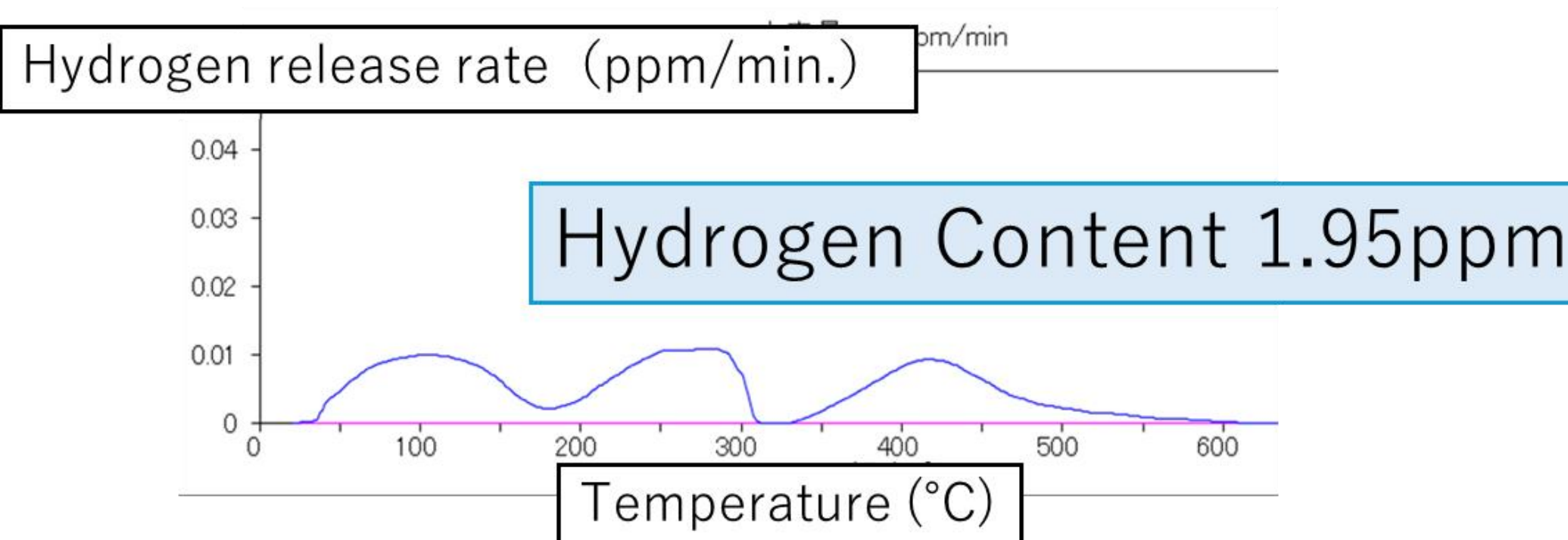
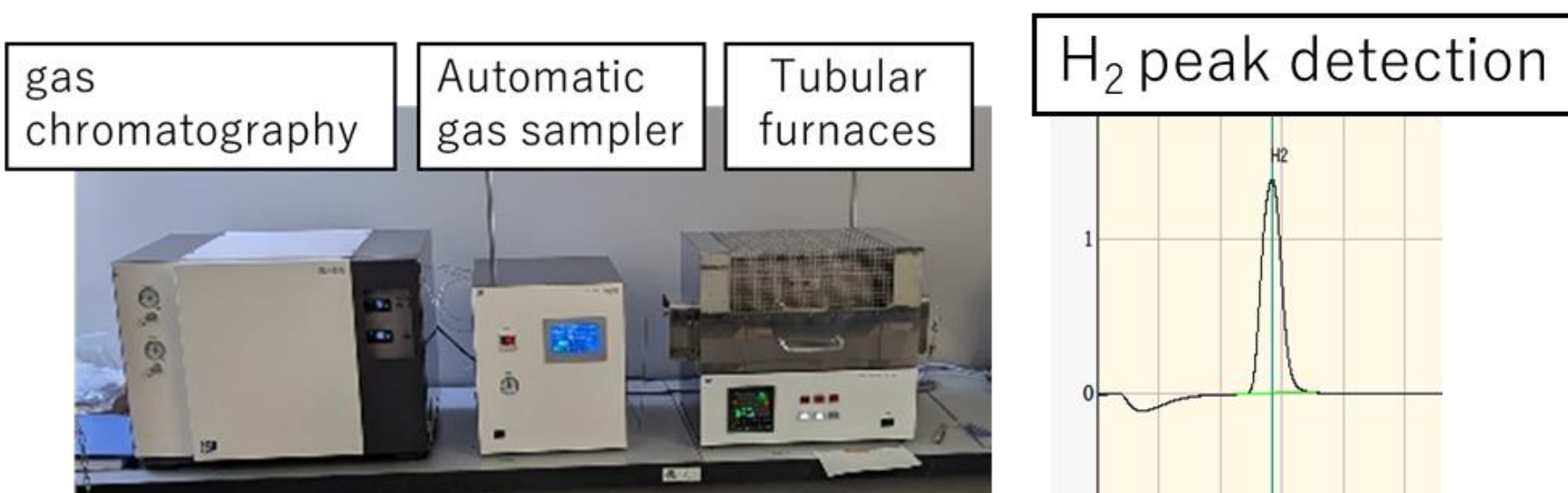
Research period : 2023-2025

## ① Cathodic hydrogen charging *2024 New*

Generation of hydrogen gas



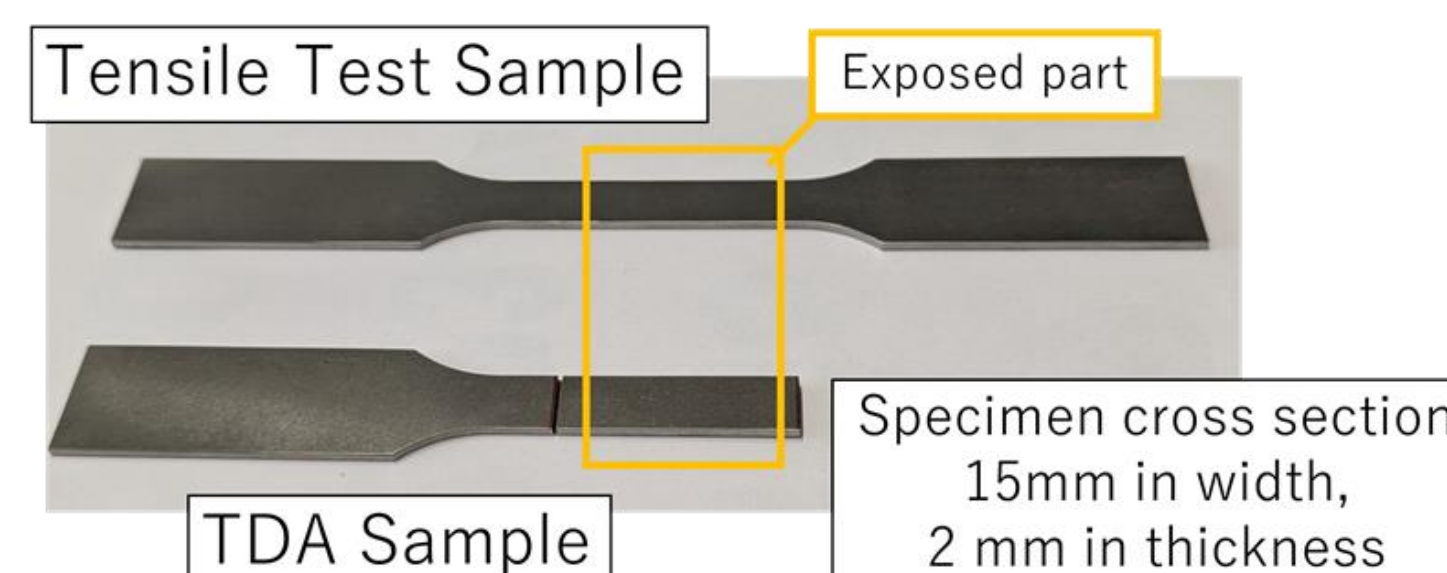
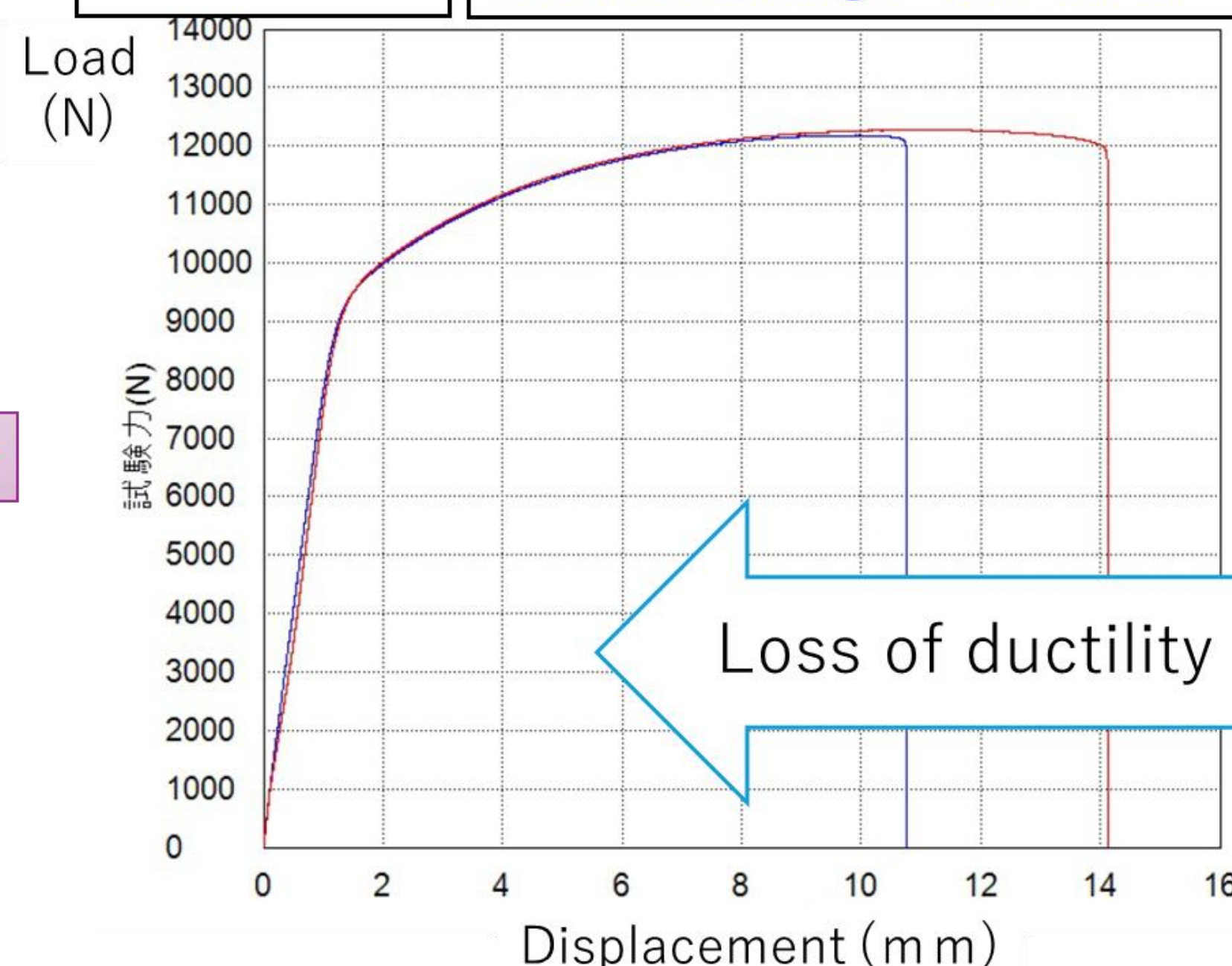
## ② Thermal Desorption Analysis (TDA) *2025.2- New*



## ③ Tensile test

Ductile Cast-iron (FCD450)

Tensile strength comparison  
**with charge 474 MPa**  
**without charge 451 MPa**



## Background · Purpose

In recent years, there are increasing cases of metal materials being used in harsh environments such as hydrogen and ammonia environments. In this study, we investigated methods for evaluating the suitability of metal materials for hydrogen or ammonia environments.

## Research Contents

We worked on the cathodic hydrogen charging method, which involves using a beaker to incorporate hydrogen into metal materials. We also started Thermal Desorption Analysis (TDA) for hydrogen. It involves heating a sample and measuring the rate at which hydrogen is released, providing information about the amount of hydrogen present.

## Summary

As a result of tensile testing of hydrogen-charged FCD450, the load-displacement curve showed typical hydrogen embrittlement behavior, with early fracture. The hydrogen content at this time was 1.95 ppm, confirming the validity of the cathodic hydrogen charging performed by our laboratory.