DELYCIOUS

Clean Hydrogen Partnership

Co-funded by the European Union

D3.1

Raman device boundary conditions

Document control sheet

Project number	101192075		
Project name	Diagnostic tools for ELectrolYsers: Cost-efficient, Innovative, Open, Universal and Safe		
Project acronym	DELYCIOUS		
Call	HORIZON-JTI-CLEANH2-2024		
Topic	HORIZON-JTI-CLEANH2-2024-01-04		
Type of action	HORIZON-JU-RIA (Research and Innovation Action)		
Granting authority	Clean Hydrogen Partnership and European Union		
Start date	01/01/2025	Duration	36 months
Project coordinator	Fraunhofer IWES		

Deliverable ID	D3.1		
Deliverable Name	Raman device boundary conditions		
Deliverable Type	OTHER		
Work Package No	WP3	Deliverable version	1
Due date	28.02.2025, M2		
Actual submission date	28.02.2025		

Lead Beneficiary	HORIBA	
Author (s)/ Contributor(s)	Artur Aleksanyan, Vianney Boyer, Olivier Nicolle, Guillaume Kessler, Samantha Ngo and Kurt Klauke	
Dissemination level	Public	☐
	Sensitive	☒
Reviewed by	Giulia Raimondi, AL ICF	
Document Approval	Technical Manager and WP Leaders	

Revision History after EC review

Date	Version	Modification	Author(s)

Clean Hydrogen Partnership

Co-funded by the European Union

The project is supported by the Clean Hydrogen Partnership and its members under the GA 101192075. Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the Clean Hydrogen Partnership. Neither the European Union nor the granting authority can be held responsible for them.

Summary

HORIBA has developed an Inline Multi Probe Raman Gas Analyzer. This technology, using a Raman spectrometer as an analyzer, and Raman probes for the excitation and collection of the gas sample can provide a gas composition analysis in real time.

The HORIBA gas Raman analyzer will be implemented and used to monitor performances on lab scale on three types of electrolyzers (PEM, SOE, AEL) and on large scale, on AEL electrolyzer. This technology will be used in parallel to other devices such as electrochemical impedance spectroscopy (EIS) to ensure a full multi point monitoring of the system performance. Horiba will provide a 2-probe system to monitor a complex gas composition at two points of the system simultaneously (for example: on the H_2 line and at O_2 line exhaust).

The Raman system that will be provided by HORIBA for the DELYCIOUS project will use two 532 nm, 2 W lasers, each coupled into a probe. The system's limit of detection is less than 1% in 1s at 1 bar for H_2 and less than 0.25% in 20s at 2 bar for H_2. With a warm-up time of less than 30 min, and a span drift of +/- 0.1% absolute in 2 days, the system provides an excellent stability and less frequent recalibration.

The software from this HORIBA system can be integrated into HORIBA STARS Automation, a comprehensive set of solutions to automate a wide range of test bed types. The user can use it as a standalone software, to acquire data, analyze them, save them, or optionally integrate the software with a HORIBA test station automation software. AK Protocol is used for communication with external devices to control the instrument.

Clean Hydrogen Partnership

Co-funded by the European Union

The project is supported by the Clean Hydrogen Partnership and its members under the GA 101192075. Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the Clean Hydrogen Partnership. Neither the European Union nor the granting authority can be held responsible for them.