OBJECTIVES

Develop highly active and long-term stable non-PGM catalysts for the PEMFC cathode and re-design the cathode catalyst layer. Develop and characterise PGM-free and ultra-low PGM anode catalysts with improved CO and sulfur tolerance.

NON-PGM CATALYSTS

The ideal industrial goal is for PEMFC stacks for transportation application to use non-PGM catalysts with performance and durability comparable to those obtained from Pt.

ENVIRONMENTAL BENEFITS

Fuel cell and hydrogen based technologies can contribute towards significantly reducing greenhouse gas and nitrogen oxide emissions.

PROJECT COORDINATOR

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PRETEXO

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CRESCENDO

Critical Raw material ElectrocatalystS replaCement ENabling Designed pOst-2020 PEMFC

CRESCENDO is an 8 partner consortium working to progress non-PGM fuel cell catalysts to higher performance and stability, rationally re-design the catalyst layer to achieve 0.42 W/cm^2 at 0.7 V and assess the feasibility and cost benefits of novel non-PGM cathode MEAs for automotive applications.

www.crescendo-fuelcell.eu

PROJECT STRUCTURE

CRESCENDO comprises five technical work packages (WP2 - WP6), and two supporting work packages (WP1 and WP7).

WP1
Project management

WP7
Knowledge management, communication and dissemination

WP2
Requirements, benchmarking, industrial scale testing, life cycle and cost analyses and exploitation potential

WP2 defines the automotive system requirements that dictate the power density and durability targets of the project and that thereby establish the catalyst activity and stability requirements. WP2 also comprises benchmarking of a selected number of state of the art non-PGM cathode catalysts and industrial scale testing of the final down-selected catalyst in a large scale (>200 cm^2) cell.

WP3
Non-PGM cathode catalysts

WP3 is where non-PGM cathode catalysts will be developed. They will be screened for their activity and stability with the full range of electrochemical and physicochemical methods appropriate for such materials including new diagnostic tools. The most promising catalysts will be fed into WP4.

WP4
Diagnostics and approaches for improved non-PGM cathode durability

WP4 will introduce approaches to confer long term stability to the best WP3 catalysts and will develop methodologies to screen for stability towards free radical induced degradation. Active site density will be quantified before and after fuel cell operation, and local techniques used to investigate the catalyst in-operando..

WP5
Advanced cathode layer design for non-PGM catalysts

WP5 will initially troubleshoot the standard catalyst layers prepared with the CRESCENDO reference catalyst, by identifying the individual losses within the layers. Using this understanding, WP5 will modify the layer design and incorporate the best catalysts into high performance, durable cathode layers.

WP6
Ultra-low-PGM and non-PGM anode catalysts

WP6 will develop and characterise PGM-free and ultra-low PGM anode catalysts with improved CO and sulfur tolerance. They will be transferred to WP5 for anode catalyst development reaching activity targets at PGM loadings <0.025 mg/cm^2.