

ALIVE (Anode Layer InnoVation for water Electrolysis)

Publieke samenvatting / Public summary

Aanleiding

Green hydrogen is pivotal in achieving net zero emission targets as it replaces grey hydrogen produced from natural gas. The Netherlands is determined to play a leading role in the global green hydrogen economy fuelled by its position as the second largest consumer and producer of hydrogen in Europe, its offshore wind capacity, existing infrastructure and renown logistics domain. Development of the value chain strengthens the Dutch economic position, from material to high-tech components, and from integrated electrolysis systems to the application of hydrogen (for example in industry) leading to sustainable business. The cost of hydrogen remains a major barrier and innovations are required to make hydrogen production more robust and cost competitive. Proton Exchange Membrane Water Electrolysers (PEMWE) are the most favourable method for conversion of intermittent renewable energy to compressed high purity hydrogen. State-of-the-art PEMWE uses bulk iridium metal as catalyst material at the anode layer for catalyst coated membranes (CCMs), it is however costly and has limited availability. ALIVE aims to develop innovations at the anode catalyst layer to enable ultra-low iridium PEMWE

Doelstelling

The main goal of ALIVE is to develop an anode layer of catalyst coated membrane (CCM) with ultra-low iridium loading leading to a CCM with lower cost, increased performance and increased durability.

Projectinformatie / Project information

Projectnummer / Project number
TIND24-03692741

Subsidiebedrag / Grant amount
€ 486.138,00

Algemene informatie / General information

Penvoerder / Secretariat
Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO

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ALIVE aims to match the performance and durability of state-of-the-art CCMs which use high loadings of iridium (up to 2 mg/cm²) with a novel catalyst powder that enables loadings of <0.1 mg/cm². ALIVE envisions to make innovative progress in catalyst optimization and fabrication as well as CCM fabrication in the anode layer of the PEM water electrolyser. ALIVE aligns with one of the key themes of TKI Energy and Industry - the multi-annual mission driven innovation program (MMIP-7) "CO₂-vrije industriële energiehuishouding, Deelprogramma 4: Elektrolytische productie van waterstof" where one of the key targets is cost reduction, efficiency, flexible use of electrolyzers and materials intensity. The focus of ALIVE on research and development for cheaper, climate friendly products is also the objective of the 'Energie & Klimaat Onderzoek en Ontwikkeling (EKKO)' subsidy.

Korte omschrijving

The project has been divided into three work packages with activities for optimizing and fabricating the anode catalyst and the Catalyst Coated Membrane (CCM) to be done within 24 months. Powall will take the lead in the fabrication of the novel catalyst powders to improve catalytic properties such as activity, stability, and conductivity of the catalysts. Secondly, TNO takes the lead to investigate, understand, and optimize the quantifiable relationships between the CCM fabrication parameters and the performance of these CCMs. The last work package, led by TNO, will benchmark the CCMs in produced and provide the link between the CCM performance and the fabrication parameters of the catalyst and CCM.

Resultaat

The results of this project are (1) High performance CCM: The anticipated high-performance CCM will effectively demonstrate the properties of the novel catalyst material with respect to traditionally used bulk iridium material. By the end of the project, the catalyst material is expected to be close to market introduction and could be used by CCM manufacturers to produce low-iridium and high

performing CCMs. (2) CCM fabrication expertise: The distinctive CCM fabrication expertise with novel materials will be of value to the entire supply chain in the Netherlands as it will help CCM/catalyst manufacturers to increase the performance of CCMs, while helping stack manufacturers understand and select better CCMs with lower costs. Ultimately, this will help to decrease the usage of Platinum Group Metals (PGM) and result in lower cost of stacks and consequently the green hydrogen produced.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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