

Samenwerking in Noord-Brabant

Make Hydrogen Work 24 juni 2025

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MHW-werkwijze

- Campus & rollen
- L&D Netwerk van HR-professionals
- Individuele ontwikkelpaden
- Bedrijfsontwikkelpaden
- Verifieerbaar kwaliteitsframework
- CRM
- Learning Management Systeem
- Vacature matchingsysteem

Vanuit de casus Noord Brabant:

- Welke structuren/rollen/tools zijn in de regio beschikbaar? (kansen)
- Met welke structuren moet verbinding gemaakt worden?
- Wat moet eventueel nog (door)ontwikkeld worden?

Inhoud

Sterke regionale samenwerking (triple helix)

- Het Brabantse bedrijfsleven
 - ✓ Enkele bedrijfsvoorbeelden
- Onderwijs in Brabant
 - ✓ Regulier onderwijs
 - ✓ Leven Lang Ontwikkelen (LLO BLEND)
- Onderzoek Waterstof bij TU/e, Avans, Fontys en Summa
- Inzet van AI ter ondersteuning Community

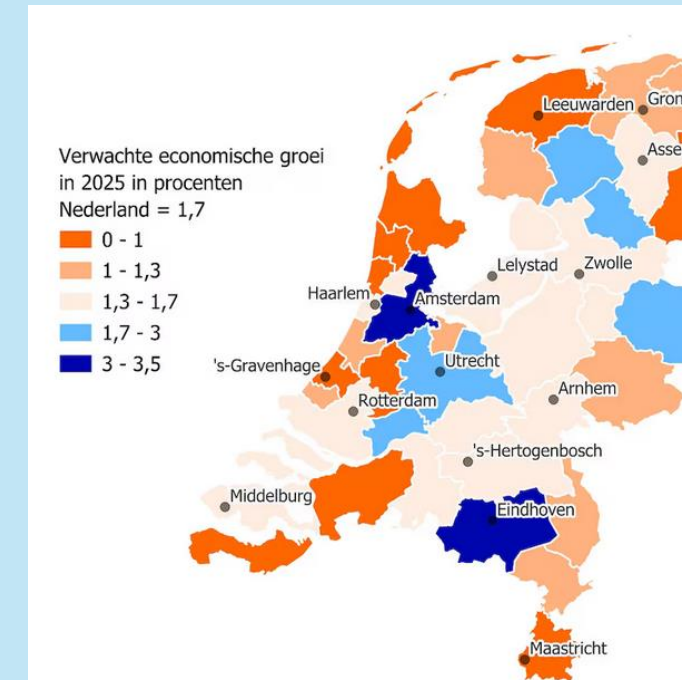
Sterke regionale samenwerking

“Brabantse H2 innovatie coalitie” met 25 bedrijven en steun vanuit Provincie en BOM

Veel focus op het maken van systemen of componenten.

Provincie NB heeft ook steun verstrekt aan ca 40 studententeams (BOOST project).

Deelnemende partners oa:



Enkele bedrijfsvoorbeelden (veel focus op het maken van onderdelen)

50-100 kWe
decentralized units
PEM



Productie van PEM cellen
en stacks

6 MWe demo in Tilburg



Productie van alk. cellen en
stacks

50 kWe alkaline demo



RWE

Feasibility Delfzijl,
Oranjewind

TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY

SUMMA
College

Fontys > FOR SOCIETY

avans
hogeschool

Bouw 100 MWe Lingen

Enkele bedrijfsvoorbeelden (2)

Waterstof, ecosysteem Brabant

Legenda:



PEM



AEM



ALK



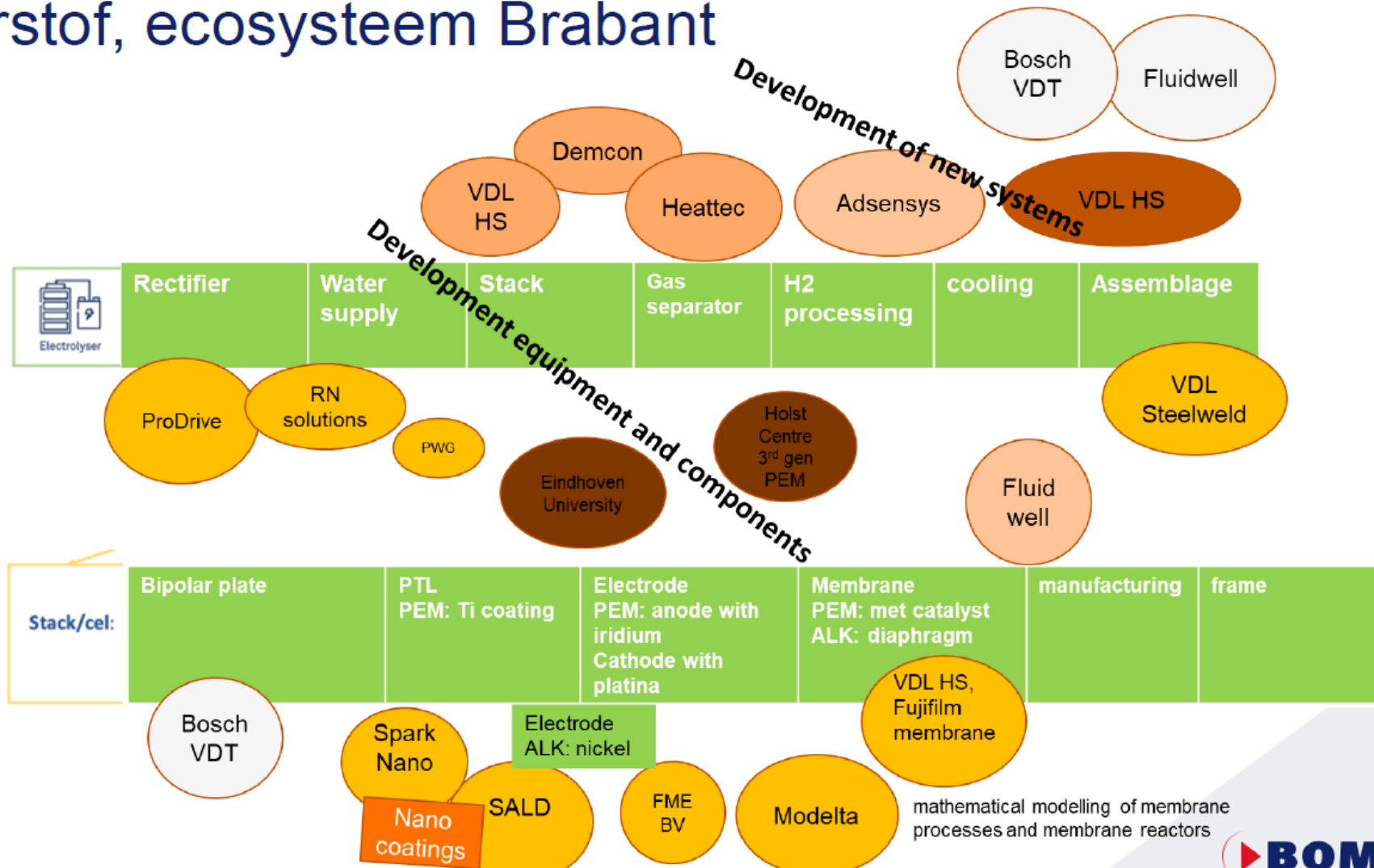
SOEC



Tier 1 / 2
supplier



Expertise



Onderwijs

- Regulier onderwijs
 - Projecten
 - Ontwikkeling van leerlijnen op thema's + keuzedelen (MBO) + TGO (HBO)
 - Interreg – Energie(k) Onderwijs: samenwerking Brabantse onderwijspartners met Vlaamse, Zeeuwse en Limburgse onderwijsinstellingen om te komen tot onderwijsmodules energietransitie
 - Extra curriculaire: studententeams
- LLO:
 - RIF “daar brandt nog licht” : Leren en innoveren voor de energietransitie in Brabant
 - Brabant Leert Transitiehubs Energie: circulaire bouw, batterijtechnologie & installatietechniek
 - BLEND: “Blended Learning with energy systems and novel directions for education” (in opstart)
 - HCA Groenvermogen: “United Brains 4 Hydrogen”

LLO Project BLEND (NGF LLO katalysator)

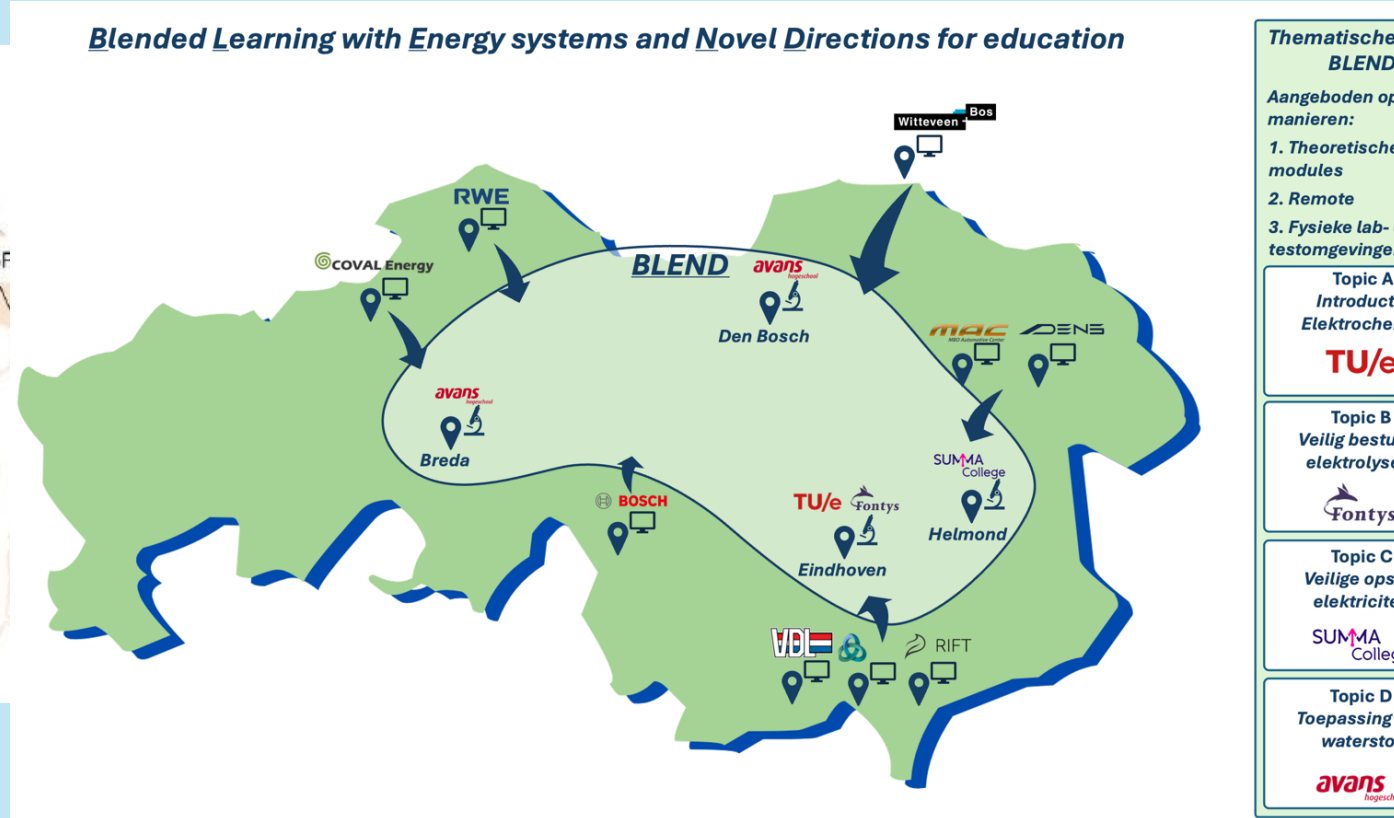
Focus op Electrochemie inclusief elektrische aandrijvingen (net iets breder dan H2)

Brabantse bedrijvennetwerk via BOM:



in NGF Groenvermogen WP1: Advensys, Avox, Bosch, Fujifilm, Demcon, Fluidwell, Prodrive, Sald, Sparknano, VDL

Samenwerkingsverband via LLO Kat BS2 project BLEND:



Avox, Bosch, Coval, DENS, MAC, RIFT, RWE, VDL, Witteveen&Bos + 86 bedrijven uit de mobiliteitsbranche

LLO Project BLEND (LLO katalysator)

- Remote onderwijs met echte apparaten is al wel bewezen in het elektrotechnische domein, nog ontbrekend voor waterstof, elektrische aandrijvingen en de brede elektrochemie.
- Demonstreren, testen en verbeteren op de 3 onderwijsnivo's (MBO, HBO, WO) voor de werkende professional (meertalig)
- Filmpje



LLO Project BLEND (concept modules)



**Professional training program
on
Green H₂ & Electricity storage**

TU/e
EINDHOVEN
UNIVERSITY OF
TECHNOLOGY

Detailed Module Set up

Module A Introduction to electrochemistry (40 hrs)

- Introduction
- Electrical behavior of electrolyzers, fuel cells and battery systems
- Reaction mechanisms at main components
- Operation and operational constraints
- Development status of electrolyzers, fuel cells and batteries
- Electrochemical measuring techniques
- Characteristic curves (Current-Voltage) and butterfly diagrams
- Innovation potential for various components and systems

Study mode: self-paced online /
blended will also be tested

Module B Safe plant operation (40 hrs)

- Introduction
- History of water electrolysis
- Basics: efficiency in electrolysis
- Cell and stack design
- Safe plant operation (ATEX, hydrogen cross over)
- Personal Safety
- Development status of water electrolysis
- AWE vs PEM electrolyzers
- Gas crossover & reverse currents
- Polarization curves and ohmic resistance
- Breaking down electrolyzer performance
- Electrodes, membranes & bubbles
- Electrolyzer maintenance and monitoring
- Innovation potential in AWE

Study mode: self-paced online /
blended will also be tested

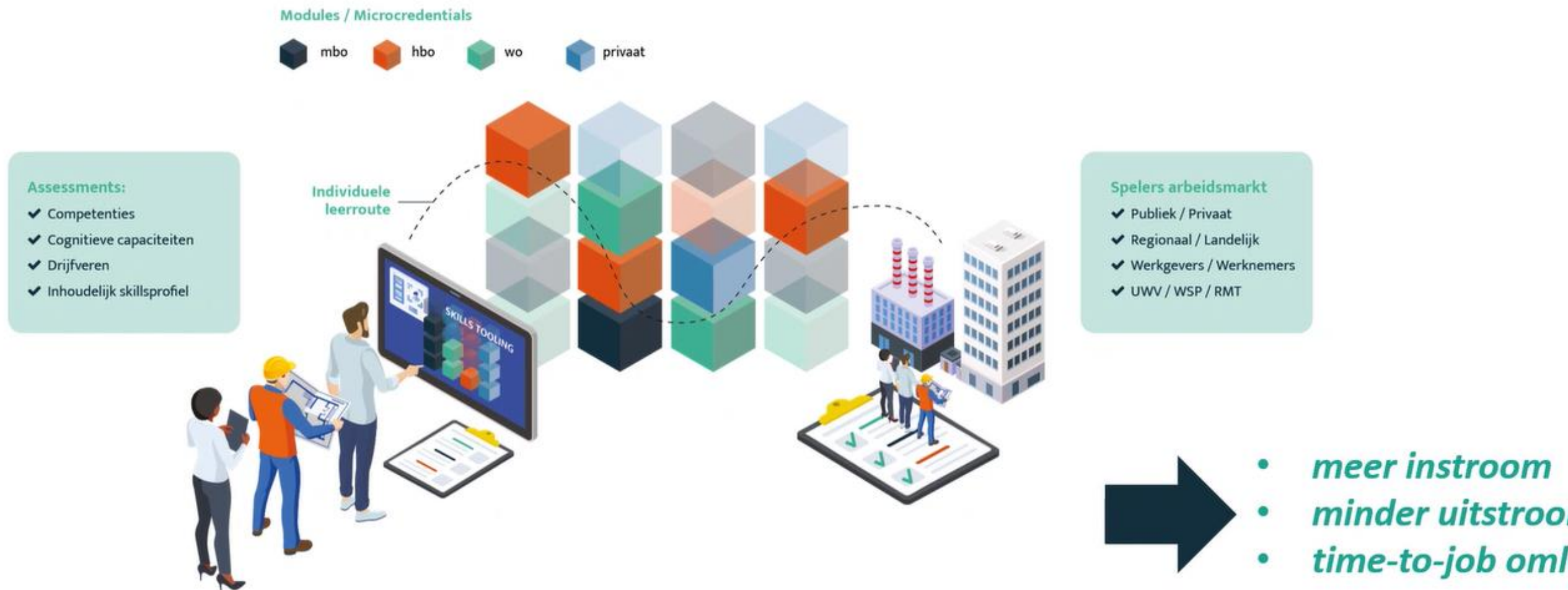
Module C Electricity storage (40 hrs)

- Introduction
- Development status of automotive electric propulsion systems (hybrid, full electric, fuel cell)
- Battery types, short /long duration energy storage
- Safe operation of battery electric propulsion systems
- Battery management systems
- Maintenance and reliability of battery electric propulsion systems
- Safe operation and maintenance of battery systems intended for grid support
- Incident management

Module D Utilization of hydrogen (40 hrs)

- Introduction
- Ammonia cracking towards H₂
- Hydrogen quality constraints depending on application
- Safe utilization of hydrogen in fuel cells
- The application of hydrogen for green steel production processes
- Iron powder as a clean way to store energy
- Safe utilization of hydrogen in ironoxide reactors
- Innovation potential

Onderwijs en onderwijsdoelen



Waterstof onderzoek in Brainport

> 230 onderzoekers
> 40 PhD's
> 3500 artikelen
> 180 PhD reports
> 53 patenten

< Search in all content | 1 - 50 out of 3,446 results | Relevance > | Export search results

Filters for Research output

Sustainable Development Goals

- ☐ SDG 7 - Affordable and Clean Energy (474)
- ☐ SDG 3 - Good Health and Well-being (26)
- ☐ SDG 13 - Climate Action (23)
- ☐ SDG 12 - Responsible Consumption and Production (20)
- ☐ SDG 2 - Zero Hunger (9)

Show more >

Type

- ☐ Article (2502)
- ☐ Conference contribution (447)
- ☐ Phd Thesis 1 (Research TU/e / Graduation TU/e) (178)
- ☐ Chapter (58)
- ☐ Patent publication (53)

Show more >

Open access

- ☐ Show OA content (1517)

Language

- ☐ English (3437)
- ☐ Dutch (7)

Showing results for hydrogen as free text ⓘ

Did you want to search for **hydrogen as a concept?**

Anomalous recombination in hydrogen plasmas : hydrogen sou

Graaf, de, M. J., Meulenbroeks, R. F. G., Dahiya, R. P., Otorbaev, D. K., Severens, R. J., **San**
van de, M. C. M. & Schram, D. C., 1992, *Proceedings of the Gordon Conference on Plasma*
Chemistry, New London, USA, 10-14 August 1992.
Research output: Chapter in Book/Report/Conference proceeding > Conference contribution > Academ

Hydrogen sensor, hydrogen detection system employing the sam
and electrical device with a hydrogen detection system

van Mechelen, J. L. M. (Inventor), Panella, B. (Inventor), Garcia, M. V. (Inventor), Westerwa
(Inventor) & Dam, B. (Inventor); 25 Feb 2016, IPC No. G01N 21/ 77 A I, Patent No.
US2016054286, Priority date 19 Aug 2014, Priority No. EP20140181427
Research output: Patent > Patent publication

Open Access

Fiber Optics Film

Atomic hydrogen level populations and hydrogen dissociation d
in an expanding thermal plasma

Otorbaev, D. K., Buuron, A. J. M., Guerassimov, N. T., Gielen, J. W. A. M., **Sanden, van de,**
M. & Schram, D. C., 1995, *Heat and Mass Transfer Under Plasma Conditions : proceeding*
the International Symposium on Heat and Mass Transfer Under Plasma Conditions, 1st, C
Turk July 4 - 8, 1994, Fauchasi, P. (ed.) New York: Begell House Inc. p. 135-142.

H₂-community (NGF Groenvermogen HCA; project in aanvraag)

Dank voor uw aandacht. Meer weten?

We helpen je graag verder!

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