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Real-time optical technique for determining impurities in hydrogen gas production.

Chromacity Ltd. reports on the development of a next-generation **optical solution** for the **detection of contaminants in renewable hydrogen.**

While renewable hydrogen is widely acknowledged
to play a growing role in decarbonising the economy, challenges remain to control its purity. With supply from diverse sources including green, blue and regasified hydrogen from storage media, users need confidence that the gas they use is of sufficient quality that it will not damage key components such as fuel cells or infrastructure.

Image caption: Determining impurities in hydrogen gas production

Working in partnership with the Herriot Watt University* and Frauhofer UK*,
a new solution combining high brightness, coherent Optical Parametric Oscillator (OPO) laser technology from Chromacity Ltd., with advanced FTIR spectroscopy techniques, has been shown to offer advantages over current technologies. ISO 14687:2019, which defines thresholds for a wide range of contaminants in hydrogen for fuel cells, is being used to benchmark this exciting development.

Julian Hayes, CEO of Chromacity Ltd commented
"Existing optical solutions for determining the purity of renewable hydrogen either compromise on spectral resolution and detection sensitivity or are overly complex making them expensive which limits deployment. Likewise, the implementation of sensitive gas chromatography techniques is limited because the instrumentation is costly, bulky, and online sampling is challenging."

He added
"Based on a single light source, our solution removes the complexities of multi-source optical techniques and so lowers the cost of ownership. The broad, tuneable bandwidth of the OPO laser allows many contaminants to be detected, including broad or complex chemical signatures. Our instrument is designed to be used in-line and has been shown to monitor the five key contaminants in the renewable hydrogen production process (as detailed in ISO 14687) in real time".

Mr Hayes concluded
"Having been successfully tested in the lab on representative gas samples, the next stage of developing the system is to enable users to use live real-time data to drive optimisation of the production process."

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For further information
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Chromacity Ltd. is a world leader in the design, development, and manufacturing of advanced ultrafast pulsed fibre lasers. Based in Edinburgh, UK, the company specialises in fixed wavelength femtosecond and picosecond optical parametric oscillator (OPO) based tuneable laser systems. Based on a novel patented laser architecture that delivers ultra stable long-term performance, the fixed wavelength femtosecond fibre lasers work at 1040nm and 920nm, and the tuneable picosecond OPO lasers work across the near infra-red and mid infra-red wavelengths from 1.4um to 12um. Lasers from Chromacity Ltd. are simple to use, with no specialist support required to operate them – you turn them on, configure and use. These compact, air-cooled devices offer unrivalled long term pulse stability without the need for on-going maintenance.

*This development project received investment from Scottish Government Emerging Energy Technologies Fund (EETF) – see https://www.gov.scot/publications/emerging-energy-technologies-fund-hydrogen-innovation-scheme-successful-projects/

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