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GREEN HYDROGEN SMART GRIDS AND ALKALINE ELECTROLYSIS THE LOW COST HIGH EFFICIENCY SOLUTION

Charles William Dunnill

Swansea University, UK

As the world turns towards a renewable energy dominated energy landscape, the storage of intermittent energy becomes ever more important. Balancing supply and demand is crucial with many intermittent sources not correlating with user requirements. Additionally the energy landscape is changing from a traditional, one to many approach where one power station delivers energy to a multitude of houses and businesses, to more distributive many to many approach where the network is highly complex with multiple sources big and small feeding into the system and many consumers all needing to be balanced. This talk will look at how hydrogen holds a potential solution to decoupling of supply and demand and the reconfiguration of the network. All renewable energy sources that are not immediately consumed can be converted into hydrogen which acts as a universal energy vector storing and distributing the energy where needed. We will show how new water splitting technology can achieve low cost, high efficiency energy transition and how a green hydrogen smart grid has been operated in Swansea. We will also look at potential projects around the world that could benefit from installations.

Water+ ENERGY→ H_2+$O_2$$H_2$+$O_2$→Water+ENERGY

Recent Publications

1. Jones D R, Al-Masry W A and Dunnill C W (2018) Hydrogen-enriched natural gas as a domestic fuel: An analysis based on flash-back and blow-off limits for domestic natural gas appliances within the UK. Sustainable Energy & Fuels DOI: 10.1039/C7SE00598A.
2. Phillips R and Dunnill C (2016) Zero gap alkaline electrolysis cell design for renewable energy storage as hydrogen gas. RSC Advances 6:100643-100651.
3. Phillips R, Edwards A, Rome B, Jones D and Dunnill C W (2017) Minimising the ohmic resistance of an alkaline electrolysis cell through effective cell design. International Journal of Hydrogen Energy 42(38):23986-23994.

Biography

Charles William Dunnill is now a Senior Lecturer at the Energy Safety Research Institute at Swansea University. He has completed MSc in Chemistry from Nottingham and PhD in Nanomaterial's from Glasgow University. His previous posts at UCL Chemistry include a prestigious Ramsay Fellowship and a Post-doc in photocatalytic self-cleaning materials and photocatalysts. He runs a team of researchers interested in the sustainable hydrogen innovation and technology.

C.Dunnill@swansea.ac.uk