

Challenges and Opportunities for Sustainable Hydrogen Detection

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ABSTRACT

Hydrogen is a form of clean energy with the potential to replace the dependability on fossil fuels by powering vehicles. In comparison to other combustible gases such as methane and propane, hydrogen has a lot of remarkable properties (for example, lower density, low boiling point, minimum ignition energy) which make it a potential candidate in today's emerging economy called the 'hydrogen economy. Since hydrogen is gas without color, odor and taste, it is almost impossible to sense the hydrogen by human organs and therefore, different technology, devices and systems are prerequisite to identify its presence in the particular environment, Additionally it is also difficult to quantify its concentration during production, storage, and transportation applications. Highly flammable nature of hydrogen reinforce the need of detection of any minor leaks. Hydrogen sensors have been successfully employed for management and monitoring in manufacturing plants, small scale production units , pipelines, refilling stations, turbine generators where hydrogen is used as a coolant and for shuttle, rocket launching station as well as many other operation of space and defence industries. The presented paper will provide a summary in the areas of hydrogen detection technology for various industries and processes.

I. Introduction

Depending on the applications, hydrogen are often used as (i) strong chemical agent for several elements (ii) desulphurization for variety of petroleum products (iii) rocket fuels for space and other applications (iv) for metallurgical processes (v) for nuclear energy plants (v) welding and galvanic plating etc. except for these, hydrogen may be used as an energy carrier to resolve the matter of limited availability of fossil fuels. within the atomic energy stations, uncontrolled production of hydrogen can form potentially explosive mixtures with air which may result into explosions. Figure 1, is explaining hydrogen based economy where hydrogen can be utilised as green energy source of power.



Figure 1. Hydrogen based economy, where it can be used as green source of power.

A hydrogen explosion resulting into a nuclear accident has recently been reported in 2011 at the nuclear power plant in Fukushima, Japan. It is possible to detect Hydrogen at very initial stages through sensor

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