

„Fuel Cells for Aeronautic Applications“

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Kurzfassung:

The aviation sector plays a key-role in a sustainable and environment-friendly industry to reduce greenhouse gases and thus counter climate change. Therefore, the European Commission determined climate neutrality by 2050. In order to reach these imposed goals, the aviation industry is now in need of long-term, disruptive change to business as usual - and hydrogen has emerged as an attractive option. Fuel cells convert energy into electrical power via an electrochemical reaction of hydrogen and oxygen. Hydrogen shows a three times higher gravimetric energy density than traditional jet fuel and is much superior than lithium-ion batteries making it a good option to fuel large aircraft over long distances. The fuel cell technology emerging from the automotive industry is of high interest for the future aeronautic industry. While these are usually in the powerclass of 100 kW, aircrafts require several MW amounts of power and must operate at different temperatures and pressures, while keeping the system's safety and reliability levels to aeronautical standards. Moreover, fuel cells are one of only two technology pathways, alongside battery electric, through which no greenhouse gases are emitted. The requirements for fuel cells in aviation are much higher regarding safety and weight. This is leading to a different set of key parameters such as gravimetric power density, lifetime, efficiency and reliability compared to automotive applications. In addition to that, the different operating conditions for fuel cells for aviation influence significantly the engineering and development process of fuel cell stacks compared to other fuel cell applications. This presentation is intended to provide an overview of how fuel cell technology is developed from the single MEA component to a complete fuel cell stack for aeronautical application. It displays the technical barriers that have to be overcome in the future and what similarities and differences to fuel cells in automotive are existing.