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Gasifier-SOFC systems and applications

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Gasification of coal, petro coke, biomass etc., results in the production of syngas which finds its use in many applications such as production of chemicals, electric power and heat. Electric power production using syngas is often done with the help of internal combustion engines, conventional steam power plants or gasification based combined cycle plants (with gas turbines and heat recovery steam generators). Such systems have relatively low electrical efficiencies (maximum 40-50%). An alternate approach that might be feasible on industrial scale in the future is the use of solid oxide fuel cells to produce electric power using syngas as fuel. With thermodynamic calculations, it has been shown that high electrical efficiencies around 70% might be achievable with such systems. However, there are many challenges to overcome before such systems are realized. They include, for example, the development of appropriate gas cleaning and gas processing systems to be placed between the gasifier and the solid oxide fuel cell. This paper presents a brief overview of current state of the art with gasifier-SOFC systems, their potential applications and the present day challenges. Special attention is given to potential applications in the Middle East.

Biography

P V Aravind is an Associate Professor at Delft University of Technology. He teaches courses on Thermodynamics of Energy Conversion and Fuel Cell Systems at Delft. He also teaches at TU Munich in Germany and contributes to a course at KU Leuven in Belgium. He is involved in several national, European and international energy related research projects focusing on fuel cell systems. Currently, he supervises a team of 9 PhD students, 2 Post-doctoral researchers and several MSc students. Many of his team members are involved in SOFC system development with a special focus on Gasifier-SOFC systems.

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