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Material challenge for future fuel factories

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The modern society consumes a lot of energy every day and need efficient energy supplies. At the same time, the world pursues an energy matrix where the major part of the energy production originates from green but often fluctuating energy sources. In some periods renewable energy will produce much more energy than consumed and other times not enough. To handle these variations and achieve efficient energy utilization, a need for eco-friendly storage and enhancement of these green energies will be central for the future. Fuel factories will be a fact for the world of tomorrow; a place where oversupplied energy will be taken; converted, upgraded and stored.

A considerable focus since the eighties has been on converting energy from etc. wind turbines to hydrogen and from hydrogen to liquid fuels. The conversion from electricity to hydrogen occurs in harsh environment like alkaline electrolyzes, solid oxide electrolyzer cells and polymer electrolysis cells, all having different and challenging material issues. Further post-processing e.g. methane and methanol production from biogas requires yet a process which also put out need for durable and corrosion resistant catalysts. The advantage of using the hydrogen in a methane production in Denmark, is the gas grid and gas storage facilities which already exist.

This presentation will focus on durability of materials for hydrogen production and upgrading, with focus alkaline electrolyzes components and catalytic electrodes, catalysts and corrosion issues in the methane production line.