

CAN WE REPLACE PLATINUM METALS IN PEM FUEL CELLS AND ELECTROLYZERS?

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PEM fuel cells and electrolyzers have reached a high state of maturity and they are an attractive choice from a performance and reliability point of view. However, cost is still high and as it is continuously reduced for most components, the dependence of noble metals as catalysts becomes an issue. This is not only from perspectives of cost but also of availability. Platinum is the standard catalyst for both oxygen reduction and hydrogen oxidation in PEM fuel cells and in the equivalent electrolyzers, platinum is used for hydrogen evolution while iridium is used for oxygen evolution. Iridium is even more rare than platinum.

Most of the work on minimizing the noble metal content is reported for fuel cells. Strategies for reducing the platinum loading by optimization and by alloying have been quite successful, but a complete replacement is of course the dream. Over recent years, the steady progress has been made with oxygen reduction catalyst based on structures of carbon, nitrogen and light transition metals. [1] The oxygen catalyst in the electrolyzer is a special challenge due to the high potential of the electrode.

The presentation will briefly review the development of non-noble metal catalysts for use in the acidic environment of a PEM cell and then present recent results from our group with carbon encapsulated iron carbide as an oxygen reduction catalyst. [2-4]

References

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