

Researchers harness nature to produce the fuel of the future

January 30 2013, by Catherine Zandonella

Hydrogen has tremendous potential as an eco-friendly fuel, but it is expensive to produce. Now researchers at Princeton University and Rutgers University have moved a step closer to harnessing nature to produce hydrogen for us.

The team, led by Princeton chemistry professor Annabella Selloni, takes inspiration from bacteria that make hydrogen from water using enzymes called di-iron hydrogenases. Selloni's team uses computer models to figure out how to incorporate the magic of these enzymes into the design of practical synthetic catalysts that humans can use to produce hydrogen from water.

In this latest paper, Selloni and co-authors present a solution to an issue that has dogged the field: the catalysts designed so far are susceptible to poisoning by the oxygen present during the reaction. By making changes to the catalyst to improve the stability of the structure in water, the researchers found that they had also created a catalyst that is tolerant to oxygen without sacrificing efficiency. What is more, their artificial catalyst could be made from abundant and cheap components, such as iron, indicating that the [catalyst](#) could be a cost-effective way of [producing hydrogen](#).

Selloni and her team conducted their research in silico—that is, using computer modeling. The goal is to learn enough about how these catalysts work to someday create working catalysts that can make vast quantities of inexpensive hydrogen for use in vehicles and [electricity](#)

[production](#).

More information: Sit, Patrick H.-L., Roberto Car, Morrel H. Cohen, and Annabella Selloni. Oxygen tolerance of an in silico-designed bioinspired hydrogen-evolving catalyst in water. *PNAS* 2013; published ahead of print January 22, 2013, [doi:10.1073/pnas.1215149110](https://doi.org/10.1073/pnas.1215149110)

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