

# Catalytic Photo(electrochemical)-hydrogen Production in Acidic Media

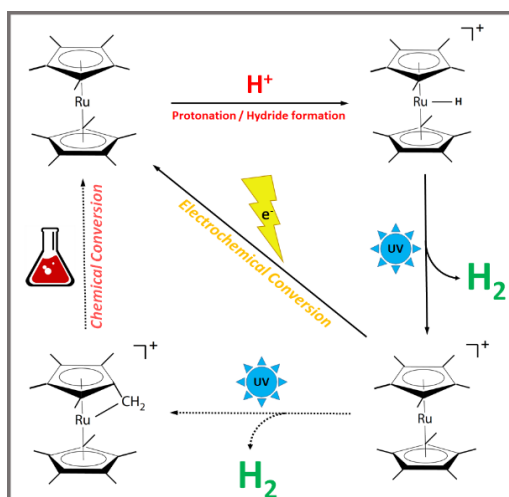
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Hydrogen is the most abundant element in universe; however, it is usually existed as a form of compound together with other elements in nature. Using hydrogen is one of the greenest source for environmental friendly energy. Although the importance of hydrogen has gained more importance in recent years, the development of new alternative, inexpensive and effective innovative techniques is more popular than conventional hydrogen production ways.<sup>1,2</sup>

Recently, decamethylruthenocene (DMRc) was used for photo(electrochemical)-hydrogen production in biphasic systems. Hydridodecamethylruthenecium specie may interact with a specific light to form hydrogen and this may go in a further unconvertible step.<sup>2,3,4</sup>



**Scheme 1.** The illustration of catalytic photo(electrochemical)-hydrogen production process

In this study, we employed novel synthetic approaches to prepare decamethylruthenocene in a cheaper way. The obtained compounds were characterized by different analytical methods. Metal-hydride bond formation using with various organic and inorganic acids was also monitored by NMR spectroscopy and photo-produced hydrogen amount was detected by uGC technique. The obtained data was examined and verified to be found that photo-hydrogen production remained in a single path in organo-acid media. We also aimed to use DFT methods to understand how the mechanism works.

## Acknowledgements

We would like to thank to the Academy of Finland (Suomen Akatemia, Funding Decision Number 334828), University of Turku (UTU) and the École Polytechnique Fédérale de Lausanne (EPFL) for their supports. We are currently working to publishing our results.

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