

# Photocatalytic hydrogen production using Pt/TiO<sub>2</sub> as catalyst

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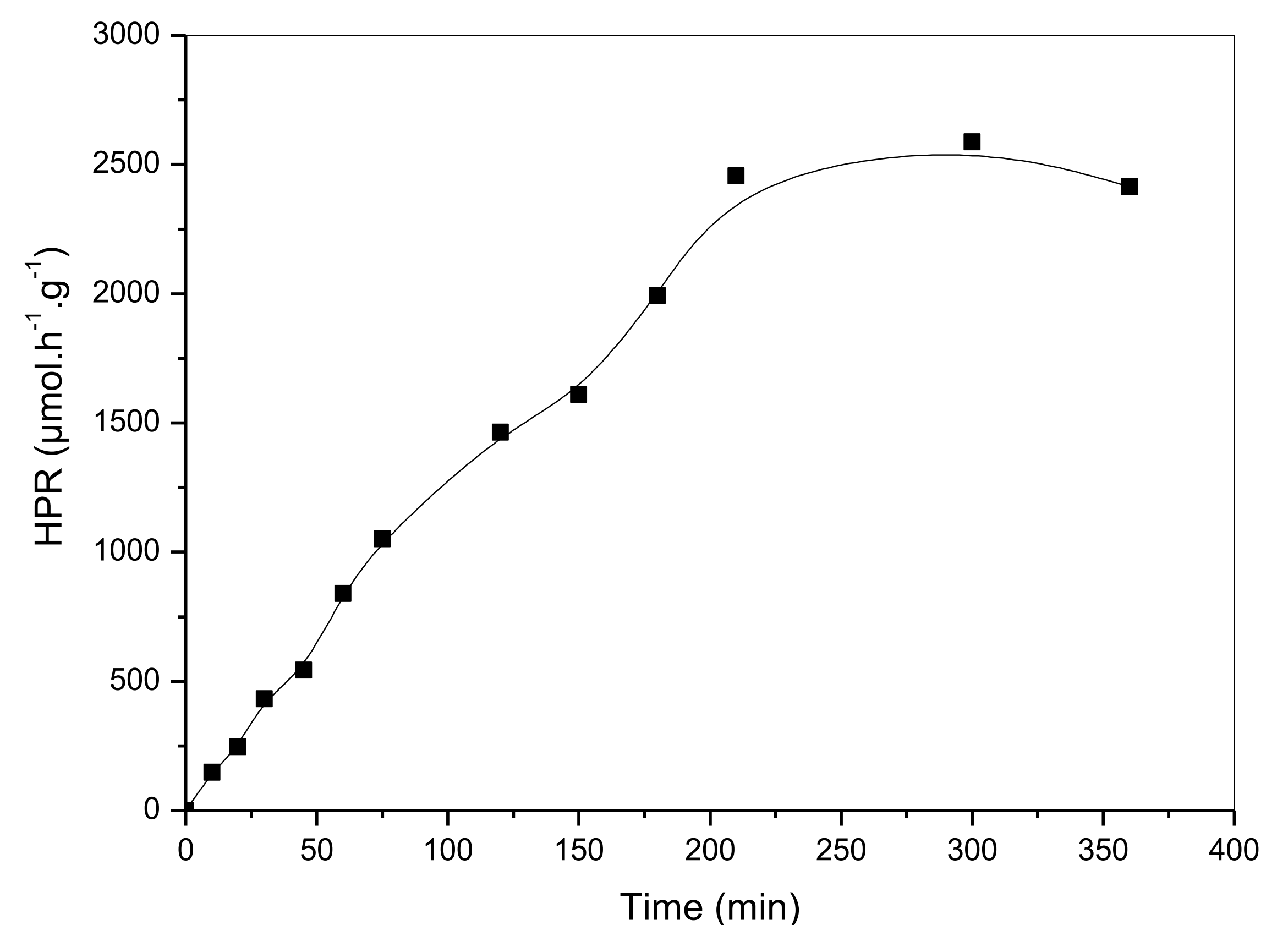
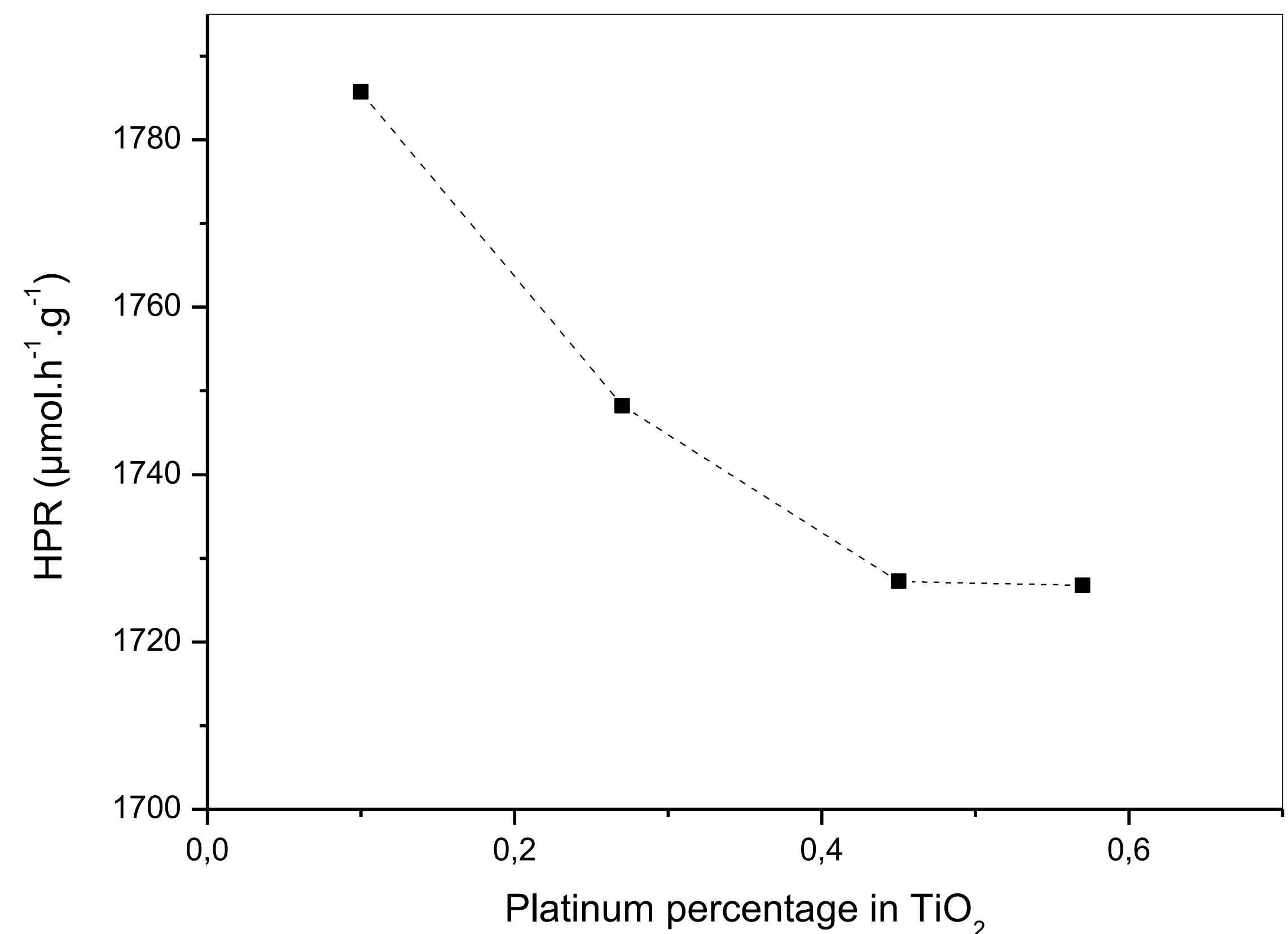
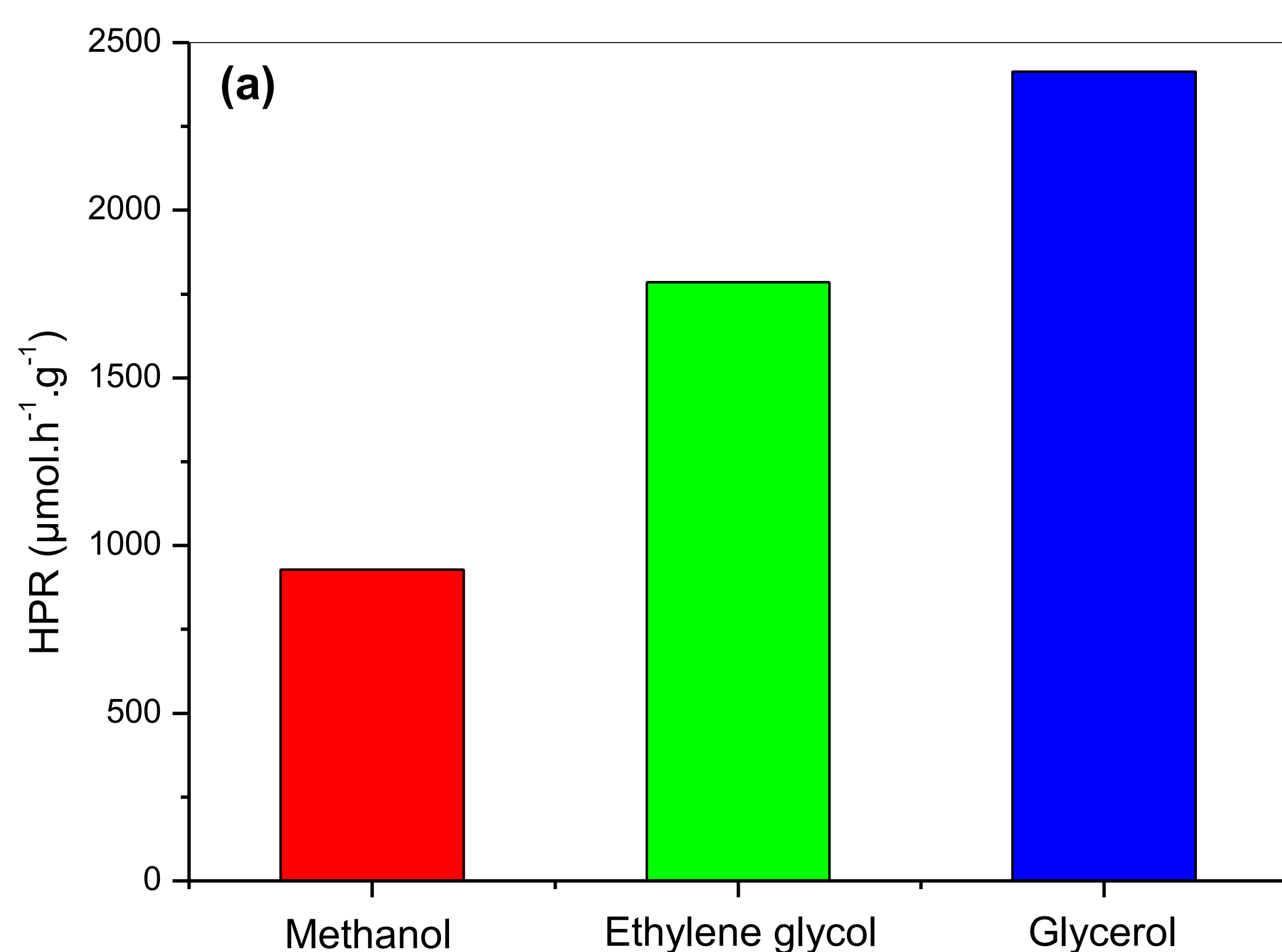
## INTRODUCTION

- The constant accumulation of pollution derived from the use of fossil fuels justifies its replacement by renewable sources. Hydrogen, for example, is a clean fuel with great potential for use and its production can occur through different routes, such as electrolysis, coal gasification and natural gas reform (ARREGI et al., 2018).
- In this work, it was synthesized a catalyst based on TiO<sub>2</sub> modified with platinum; a comparison was made between the use of methanol, ethylene glycol and glycerol as sacrificial reagents in hydrogen production; and hydrogen production was evaluated using different percentages of dopant.

## METHODOLOGY

- Pt/TiO<sub>2</sub> photocatalyst was produced using the photodeposition method on commercial titanium dioxide (P25, Degussa).
- The photocatalytic activities of these catalysts were tested in hydrogen production with the presence of different alcohols as sacrificial agents (methanol, ethylene glycol and glycerol).
- The hydrogen production was analyzed within 6 hours of reaction, in a 3% alcoholic solution and catalyst concentrations of 0.5 g.L<sup>-1</sup>.

## CONCLUSIONS



The best result was obtained using glycerol as a sacrificial reagent at a concentration of 0.5 g.L<sup>-1</sup> of Pt/TiO<sub>2</sub> (0.1%), producing a rate of 2,413  $\mu\text{mol}\cdot\text{h}^{-1}\cdot\text{g}^{-1}$ . In terms of hydrogen production, the ordering of the sacrificial agents was: glycerol > ethylene glycol > methanol. In addition, different percentages of platinum were tested (0.1, 0.27, 0.45 and 0.57%), obtaining the highest rate of production of H<sub>2</sub> with 0.1%.

## REFERENCES

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- KARTHIK, P.; NAVEEN KUMAR, T. R.; NEPPOLIAN, B. Redox couple mediated charge carrier separation in g-C<sub>3</sub>N<sub>4</sub>/CuO photocatalyst for enhanced photocatalytic H<sub>2</sub> production. *International Journal of Hydrogen Energy*, v. 45, n. 13, p. 7541–7551, 2020.

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