# Article information:

The role of alkali metal cations and platinum-surface hydroxyl in the alkaline hydrogen evolution reaction | Nature Catalysis
<https://www.nature.com/articles/s41929-022-00851-x>

# Article summary:

1. The hydrogen evolution reaction (HER) is a critical process in renewable energy conversion and storage devices, and platinum (Pt) is a state-of-the-art electrocatalyst for this reaction.

2. The HER/HOR mechanism and kinetics are drastically different in acidic and alkaline media, and various hypotheses have been proposed to identify the reaction descriptors that account for the effect of pH on the HER on Pt electrode surfaces.

3. Alkali metal cations (AM+) play an important role in the alkaline HER kinetics, which cannot be ignored in alkaline electrolytes. The presence of AM+ can destabilize surface hydroxyl species on Pt electrode surfaces, leading to improved HER activity.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

作为一篇科学论文，该文章提供了对铂电催化剂在碱性条件下氢发生反应的机理和动力学的深入探讨。然而，在阅读过程中，我们也可以看到一些潜在的偏见和不足之处。

首先，文章似乎过于强调铂电催化剂在氢发生反应中的重要性，而忽略了其他可能更具有潜力的催化剂。此外，文章没有充分考虑到环境和可持续性方面的问题，例如使用稀有金属如铂是否符合可持续发展原则。

其次，文章提出了多种假设来解释碱性条件下氢发生反应的机理和动力学，但并未提供足够的证据来支持这些假设。例如，在讨论碱金属阳离子对氢发生反应影响时，文章只引用了两篇研究论文，并未涉及其他相关研究结果。

此外，在讨论氢键结合能（HBE）对氢发生反应影响时，文章只提到了Nørskov等人引入的火山图，并未涉及其他可能更准确或更全面的描述符。同样地，在讨论水解能量障碍时，文章只引用了Markovic等人提出的观点，并未考虑其他可能存在的因素。

最后，在讨论铂表面羟基对氢发生反应影响时，文章没有充分探索羟基与其他表面吸附物之间相互作用以及它们对反应路径和动力学的影响。此外，在讨论羟基亲和力与HER活性之间关系时，文章只引用了McCrum和Koper最近进行的一项研究，并未涉及其他相关研究结果。

总体而言，该文章存在一些片面报道、无根据主张、缺失考虑点以及所提出主张缺失证据等问题。因此，在阅读该文章时需要保持批判思维并寻找更全面、准确、可靠的信息来源。

# Topics for further research:

* Alternative catalysts for hydrogen evolution reaction
* Environmental and sustainability concerns of using platinum
* Lack of evidence supporting proposed mechanisms and hypotheses
* Other descriptors for hydrogen bond strength and hydrolysis energy barrier
* Interactions between surface hydroxyls and other adsorbates
* Additional studies on hydroxyl affinity and HER activity relationship

# Report location:

<https://www.fullpicture.app/item/12aabf55b4196fe754f5f13a2f67a89b>