

Fabrication of highly efficient polyelemental electrocatalysts for hydrogen evolution through secondary sputtering phenomenon

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Platinum based catalysts have been regarded as one of the most effective water splitting electrocatalysts for hydrogen evolution reaction (HER). However, due to the high price and scarce resource of the platinum, the methods to improve catalytic performance as well as utilize the amount as minimum have been gradually studied. Among them, platinum coupled with earth-abundant transition metal is powerful to tune the binding energy of catalytic active sites and modify the binding ability of reaction intermediates, while minimizing the amount of platinum. In this study, we developed a technique that can quickly screen a group of effective binary elements for acid or alkaline reaction conditions. Secondary sputtering lithography (SSL) can easily tuned the number of the elements and inner composition using universal fabrication method, as well as highly utilize platinum with high aspect ratio nanostructure. Therefore, it is expected that effective design for more than ternary element catalysts might be possible.