

Electrocatalysis on shape-controlled metal nanoparticles: advances and challenges

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Abstract

Shape-controlled metal nanoparticles have indisputably enhanced the Electrocatalysis of several electrochemical reactions of interest both from fundamental and applied points of view [1-3]. In addition, this type of nanoparticles has remarkably contributed to a better understanding of the correlations between surface structure and electrochemical reactivity at the nanoscale. In this communication, we will discuss about recent advances in the use of shaped metal nanoparticles for different electrochemical reactions of interest, mainly those related to energy conversion applications, such as the oxidation of small organic molecules (C1 and C2) or the oxygen reduction reaction. In this regard, it is worth noting that the key point controlling the resulting electrocatalytic properties is not the particle shape but the specific surface structure of the nanoparticles. In fact, nanoparticles with a similar shape and size can have very different electrochemical properties as consequence of their different surface structure [4]. In this sense, we will also demonstrate how Surface Electrochemistry may contribute to a detailed characterization of the surface structure of metal nanoparticles thus complementing other techniques such as Electron Microscopy or X-ray Diffraction.

References

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Figure

