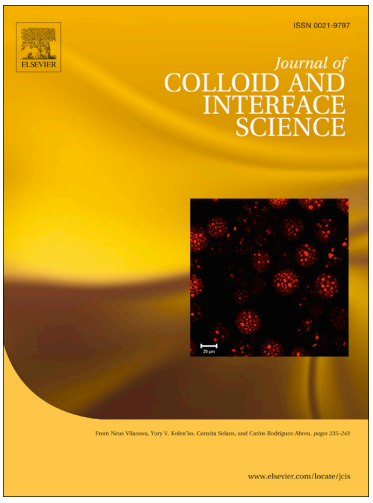

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One-pot fabrication of N-doped graphene supported dandelion-like PtRu nanocrystals as efficient and robust electrocatalysts towards formic acid oxidation

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Abstract

Engineering the architectures of metal nanocatalysts offers a valid approach for the development of electrocatalysts with greatly enhanced performances. Herein, we report the one-pot method to successfully fabricate the N-doped graphene (NG) supported dandelion-like PtRu nanocrystals. Such dandelion-like nanocrystals with different compositions can be readily tuned via the addition of different amounts of $RuCl_3$. By virtue of the large accessible surface active areas, synergistic and electronic effect, as well as the successful introduction of NG, the as-obtained PtRu/NG with optimized compositions display outstandingly high electrocatalytic activity towards formic acid electrooxidation with the mass and specific activities of 1857.4 mA mg^{-1} and 18.3 mA cm^{-2}, 6.3 and 3.3 times higher than those of commercial Pt/C, respectively. Moreover, the Pt_1Ru_1/NG can endure at least 500 cycles with less activity decay, showing a new class of Pt-based electrocatalysts with enhanced performance for fuel cells and beyond.

Keywords: One-pot method; Dandelion-like; N-doped graphene; Formic acid electrooxidation

1. Introduction

The most forbidden challenges facing the modern society is the shortage of energy crisis and environmental pollution [1]. Researching for the new resources to replace