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Electrochemical fabrication of japonica-like silver flowers

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We present a new electrochemical approach to convert a bulk thin Ag film into japonica-like Ag flowers by using a combination of 3-mercaptopropyl-trimethoxysilane (MPS) layer and cyclic sweeping potential (CSP). An intact bulk Ag layer is electroplated on MPS-grafted substrate, and then a CSP treatment is applied to the Ag-coated substrate in a weak alkaline electrolyte of CH₃COONa, NiSO₄ and Na₂SO₄. The flower-like Ag nanocrystals can be effectively produced via manipulation of potential waveform and scan rate of CSP. This method is readily extended to other metals or bimetallic system, such as Cu and Ag-Cu. This finding may open up a new route to effectively synthesize metal and bimetallic NCs with various shapes and versatile functionalities. In this work, the flower-like Ag NCs are chosen to demonstrate as high-sensitive electrode in the application of noninvasive/non-enzymatic electrochemical glucose biosensors. The 3D flower-like Ag NCs with high densities of stepped atoms exhibit extraordinarily enhanced electrocatalytic activity to glucose, which achieve a record low detection limit of 0.1 nM.

Biography

Shien Ping Feng is an Assistant Professor in the Department of Mechanical Engineering at Hong Kong University. He received his PhD in Chemical Engineering from National Tsing-Hua University (2003-2008), and was a Post-doctoral Associate at MIT from 2009 to 2011, prior to his appointment at Hong Kong University. He was a Principal Engineer, Section Manager and Technical Manager at Taiwan Semiconductor Manufacturing Company from 2001 to 2008, and a Deputy Director at Tripod Research Center from 2008 to 2009. His current research is focused on electrochemical processing and interfacial characterization of nanostructured materials and their applications on energy conversion and storage.

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