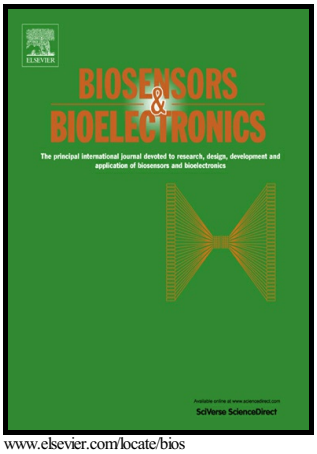
Silver-dendrimer nanocomposites as oligonucleotide labels for electrochemical stripping detection of DNA hybridization

Xin Jin, Ling Zhou, Bo Zhu, Xue Jiang, Ningning Zhu



www.elsevier.com/locate/bios

PII: S0956-5663(18)30125-8
DOI: https://doi.org/10.1016/j.bios.2018.02.033
Reference: BIOS10295

To appear in: *Biosensors and Bioelectronic*

Received date: 11 December 2017
Revised date: 30 January 2018
Accepted date: 12 February 2018

Cite this article as: Xin Jin, Ling Zhou, Bo Zhu, Xue Jiang and Ningning Zhu, Silver-dendrimer nanocomposites as oligonucleotide labels for electrochemical stripping detection of DNA hybridization, *Biosensors and Bioelectronic,* https://doi.org/10.1016/j.bios.2018.02.033

Silver-dendrimer nanocomposites as oligonucleotide labels for electrochemical stripping detection of DNA hybridization

Xin Jin, Ling Zhou, Bo Zhu, Xue Jiang, Ningning Zhu*

Department of Chemistry, College of Life and Environment Sciences, Shanghai Normal University, Guilin Road 100, Shanghai 200234, China

* Corresponding author. zhunn@shnu.edu.cn (N. Zhu).

Abstract

Silver-dendrimer nanocomposites were synthesized and used as oligonucleotide labels for electrochemical stripping detection of DNA hybridization. The synthesized silver-dendrimer nanocomposites were characterized by UV–vis spectrophotometry, X-ray photoelectron spectroscopy (XPS) and transmission electron microscopy (TEM). Ratios of silver/dendrimer were optimized in order to obtain stable nanocomposites with maximal silver loading in the interior of a polymeric shell. The silver-dendrimer nanocomposites were attached to sequence-known DNA probes specific to *colitoxin*, and used to detect probe hybridization by dissolution of the silver nanoparticles in the interior of dendrimer in a diluted nitric acid, followed by measurement of Ag^+ ions by anodic stripping voltammetry (ASV). Use of differential pulse voltammetry for the stripping step, along with optimization of the ASV conditions, enabled a detection limit of 0.78 pM. The present strategy, in combination with dendrimer-encapsulated copper labeled oligonucleotides probe reported previously, could potentially be used to detect single or multiple DNA targets in one sample.