

基于光电复合传感器的重金属检测算法的研究

作者: 郭红荪, 蔡巍, 赵会欣, 哈达, 张文, 王平

单位: 浙江大学生仪学院

基金项目: 国家973项目

摘要:

基于光寻址电位传感器 (Light Addressable Potentiometric Sensor, LAPS) 和微电极阵列传感器 (Microelectrode Array Sensor, MEA) 的复合传感器器件, 作为无线传感器网络的敏感元件, 已应用于水环境痕量重金属的检测中。本文基于该光电复合传感器, 分别对LAPS及MEA的测量曲线进行特征提取。首先, 针对有限脉冲响应 (Finite Impulse Response, FIR) 滤波器进行数字滤波后的LAPS I-V扫描曲线, 采用线性区识别和求解导数极大值点的算法, 得到其线性区的特征值。其次, 针对MEA的测量数据, 设计了求解金属溶出峰峰高及峰位置的局部极大值法, 并与切线识别法进行比较。最后, 采用多元线性回归模型对复合传感器的特性进行仿真, 将LAPS测得的pH值与MEA的溶出峰峰高进行校准, 得到令人满意的效果。

关键词: 光电复合传感器; 重金属检测算法; 特征提取; 多元线性回归

Research on quantitative algorithm of heavy metals based on Complex Photo-electrical Integrated Sensor

Author's Name:

Institution:

Abstract:

Complex Photo-electrical Integrated Sensor consists of light addressable potentiometric sensor (LAPS) and microelectrode array (MEA). It can be utilized with wireless sensor networks to the detection of heavy metals in aquatic environment. In this paper, quantitative algorithms of heavy metals based on the Complex Photo-electrical Integrated Sensor were proposed. First, the characterize curve of LAPS after finite impulse response (FIR) digital filter smoothing was, applied to liner-area recognition method, with resolve of max-point in the First Order Derivative curve. Then local max-value method was proposed to acquire the Peak Heights of practical data from MEA. At last, In order to study the properties of Integrated Sensor, Multiple linear regression was simulated to adjust the peak heights of MEA using pH values of the solution determined by LAPS, where well results were obtained.

Keywords: Hybrid Photo-electrical Integrated Sensor; Data analysis; Feature extraction; Multiple linear regression

投稿时间: 2010-06-19

[查看pdf文件](#)