

Nano Optical Probe Samarium Tetracycline  
Complex for Early Diagnosis of Histidinemia in  
New Born Children

M.S. Attia



www.elsevier.com/locate/bios

PII: S0956-5663(17)30105-7  
DOI: <http://dx.doi.org/10.1016/j.bios.2017.02.018>  
Reference: BIOS9552

To appear in: *Biosensors and Bioelectronics*

Received date: 6 December 2016

Revised date: 7 February 2017

Accepted date: 13 February 2017

Cite this article as: M.S. Attia, Nano Optical Probe Samarium Tetracycline Complex for Early Diagnosis of Histidinemia in New Born Children, *Biosensor and Bioelectronics*, <http://dx.doi.org/10.1016/j.bios.2017.02.018>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Nano Optical Probe Samarium Tetracycline Complex for Early Diagnosis of Histidinemia in New Born Children

M. S. Attia\*

Chemistry Department, Faculty of Science, Ain Shams University, Abbassia, 11566, Cairo, Egypt

\*Corresponding author: M. S. Attia, [Mohamed\\_sam@yahoo.com](mailto:Mohamed_sam@yahoo.com)

## Abstract

A new, precise, and very selective method for increasing the impact and assessment of histidine as a biomarker for early diagnosis of histidinemia disease in new born children was developed. The method depends on the formation of the ion pair associate between histidine and the nano optical samarium tetracycline  $[\text{Sm}-(\text{TC})_2]^+$  complex doped in sol-gel matrix in a borate buffer of pH 9.2. The  $[\text{Sm}-(\text{TC})_2]^+$  complex has +I net charge which is very selective and sensitive for  $[\text{histidine}]^-$  at pH 9.2 in serum and urine samples of histidinemia disease. Histidine enhances the luminescence intensity of the nano optical  $[\text{Sm}-(\text{TC})_2]^+$  complex at 645 nm after excitation at 400 nm, in borate buffer, pH 9.2. The remarkable enhancement of the luminescence intensity at 645 nm of nano  $[\text{Sm}-(\text{TC})_2]^+$  complex doped in sol-gel matrix by various concentrations of the histidine was successfully used as an optical probe for the assessment of histidine in different serum and urine samples of new born children infected by histidinemia. The calibration plot was achieved over the concentration range  $1.4 \times 10^{-5} - 6.5 \times 10^{-10} \text{ mol L}^{-1}$  histidine with a correlation coefficient of (0.998) and a detection limit of  $(3.2 \times 10^{-10} \text{ mol L}^{-1})$ . The sensitivity (98.88 %) and specificity (97.41 %) of histidine as a biomarker were calculated.

**Keywords:** Histidine; Nano  $[\text{Sm}-(\text{TC})_2]^+$  Complex; Luminescence; Histidinemia.

## 1. Introduction

Histidinemia is a rare hereditary metabolic disorder characterized by a deficiency of the enzyme histidase, which is necessary for the metabolism of the amino acid histidine. A typical characteristic of histidinemia is an increase in the blood histidine levels from normal level (70-120  $\mu\text{M}$ ) to an elevated level (290-1420  $\mu\text{M}$ ) [ Kawai et al. (2005)]. Histidinemia is considered benign with a patients of asymptomatic. The histidinemia is associated with multiple developmental symptoms including hyperactivity, speech impediment, developmental delay, learning difficulties, and sometimes mental retardation [ Kawai et al. (2005)].

Download English Version:

<https://daneshyari.com/en/article/5031032>

Download Persian Version:

<https://daneshyari.com/article/5031032>

[Daneshyari.com](https://daneshyari.com)