Novel fluorescent Schiff bases as Al3+ sensors with high selectivity and sensitivity, and their bioimaging applications

Berrones-Reyes J.

Muñoz-Flores B.M.

Gómez-Treviño A.

Treto-Suárez M.A.

Páez-Hernández D.

Schott E.

Zarate X.

Jiménez-Pérez V.M.

A short set of three new Schiff base chemosensors with high selectivity and sensitivity towards Al3+ over other metal cations in aqueous solution were developed and fully characterized. Compounds (E)-1-((L-glutamine-imino)methyl)naphthalen-2-ol (A), (E)-1-((glucosamine-imino)methyl)naphthalen-2-ol (B), and (E)-3-hydroxy-4-(((2-hydroxynaphthalen-1-yl)methylene)amino)benzoic acid (C) exhibited a significant fluorescence enhancement in the presence of Al3+ over other competitive metal ions with a low detection limit of 0.103, 0.317 and 0.091 ?M respectively, much lower than the WHO acceptable limit (0.05 mg/L or 1.85 ?M of Al3+) in drinking water. The Schiff base C, shows high sensitivity in aqueous media (Limit of detection, LOD: 0.091 ?M) and with a 38-fold (? = 1.64% for Schiff free base; ? = 63.91% for Aluminium complex) fluorescence enhancement in the presence of Al3+. The theoretical research has enabled us to rationalize the behaviours of the three selective-sensors to Al3+ synthesized in this work. Based on the design, the amino acid Schiff bases (A) showed good solubility and compatibility with and without Al3+ and some fluorescent bioimaging (FBI) are reported in human epithelial cells Hs27. © 2019 Elsevier B.V.

Al3+

Chemosensor

DFT

Fluorescent bioimaging

Schiff bases

Amino acids

Benzoic acid

Design for testability

Fluorescence

Metal ions

Metals

Naphthol

Potable water

Chemosensor

Fluorescence enhancement

Fluorescent bioimaging

Human epithelial cells

Limit of detection

Low detection limit

Schiff basis

Theoretical research

Aluminum compounds