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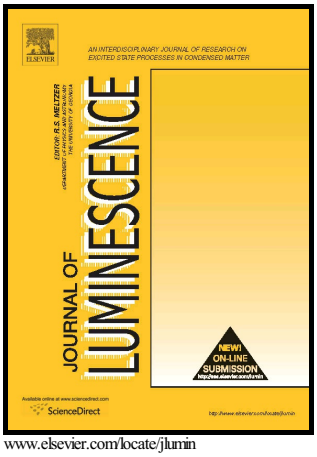


www.elsevier.com/locate/jlumin

PII: S0022-2313(18)30904-9
DOI: https://doi.org/10.1016/j.jlumin.2018.09.014
Reference: LUMIN15897

To appear in: *Journal of Luminescence*

Received date: 22 May 2018
Revised date: 1 September 2018
Accepted date: 4 September 2018

Cite this article as: Bahram Ghanbari and Morteza Zarepour-jevinani, Promotional effect of macrocyclization in O_2N_x naphtha-aza-crown macrocyclic ligands on fluorescence chemosensing of Al(III), *Journal of Luminescence,* https://doi.org/10.1016/j.jlumin.2018.09.014

Promotional effect of macrocyclization in O_2N_x naphtha-aza-crown macrocyclic ligands on fluorescence chemosensing of Al(III)

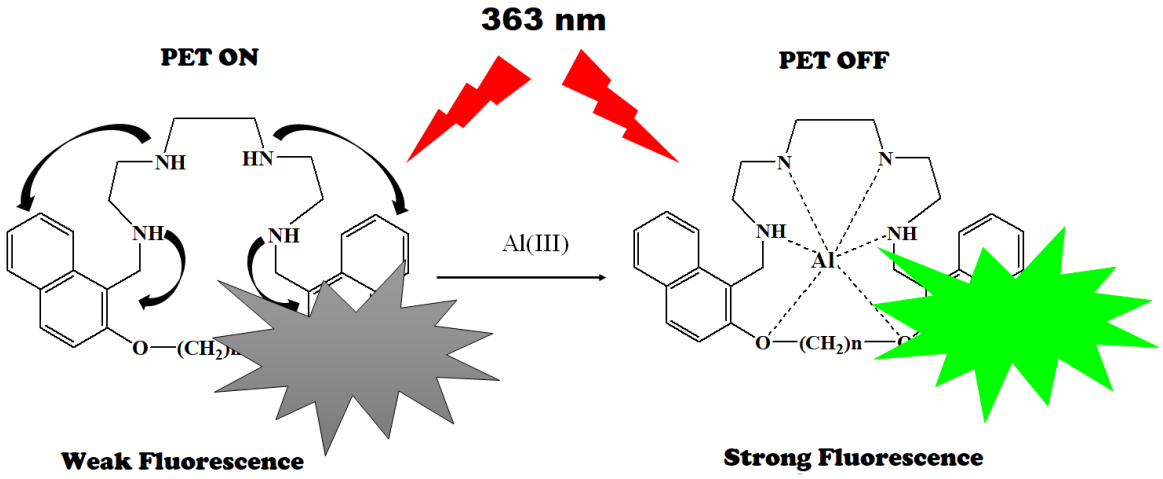
Bahram Ghanbari*, Morteza Zarepour-jevinani

Department of Chemistry, Sharif University of Technology, Tehran, Iran, PO Box 11155-3516
*Corresponding author: ghanbari@sharif.edu

Abstract

Two new macrocyclic ligands $\mathbf{L_n}$ (**L** and **L'**) bearing two fluorophore naphthalene moieties were synthesized and characterized by employing ^{1}H and ^{13}C NMR, IR, microanalysis as well as mass spectrometry. Comparative studies on the effect of assorted metal cations as Cr(III), Cu(II), Zn(II), Cd(II), Pb(II), Na(I), Ni(II), Co(II), Ba(II), Fe(II), Al(III), Mg(II), Cs(I), Ca(II), Hg(II), K(I), Mn(II), Ag(I), Fe(III) on fluorescence and UV-vis spectra of $\mathbf{L_n}$ in ethanol illustrated that both of the macrocycles were sensitive and selective fluorescence chemosensors for Al(III). Remarkable binding constant values as 1.36×10^5 M^{-1} and 1.15×10^5 M^{-1} alongside 1:1 stoichiometry for Al(III)/**L** and Al(III)/**L'** were established by employing fluorescence spectrophotometry. Monitoring of probable coordination sites on $\mathbf{L_n}$ to Al(III) by ^{1}H NMR spectroscopy indicated on the coordination of both N- and O-donor groups in DMSO-d_6. In order to elucidate the effect of macrocyclic nature in this O_2N_x naphtha-aza-crown family on the observed fluorescence chemosensing behavior of metal ion, two new O_2N_x-donor macroacyclic ligands were also prepared and characterized by the abovementioned methods. The comparative experiments revealed that the macrocyclization had an escalating role on the fluorescence parameter of the macrocycle as a metal-ion chemosensor.

Graphical abstract



Keywords: naphtha-tetraaza-crown, fluorescence, Al(III) chemosensor, macroacyclic

1. Introduction

Currently, the study of emission chemosensors for metal ion detection is primarily considerable owing to their easiness, high sensitivity, and quick responses [1-7]. In this