Molbank **2010**, M702; doi:10.3390/M702

OPEN ACCESS

molbank

ISSN 1422-8599

www.mdpi.com/journal/molbank

Short Note

N,*N*′-{1,3-Phenylenebis[methyleneoxy-2,1-phenylene(*Z*)methylylidene]}bis[1-(1-naphthyl)methanamine]

Lucy A. George [1], Emilia Bertolo [1,*] and Carlos Lodeiro [2]

[1] Ecology Research Group, Department of Geographical and Life Sciences, Canterbury Christ Church University, Canterbury, Kent, CT1 1QU, UK

[2] Grupo BIOSCOPE, Departamento de Química Física, Falcultad de Ciencias, Campus de Ourense, Universidad de Vigo, 32004, Ourense, Spain

* Author to whom correspondence should be addressed; E-Mail: emilia.bertolo@canterbury.ac.uk.

Received: 12 October 2010 / Accepted: 21 October 2010 / Published: 26 October 2010

Abstract: A new fluorescent di-imine compound containing two naphthalene groups has been synthesized by classical Schiff-base reaction between 2,2'-[1,3-phenylenebis-(methyleneoxy)]dibenzaldehyde and 1-naphthylmethylamine. The new bischromophoric compound has been characterised by IR, NMR and MALDI-TOF MS spectroscopy. The photophysical characterization was carried out by UV-vis and fluorescence emission spectroscopy, using chloroform. The monomer and excimer bands, typical for the naphthalene in solution, are present in the emission spectra for the compound.

Keywords: fluorescence; Schiff base; imine compound

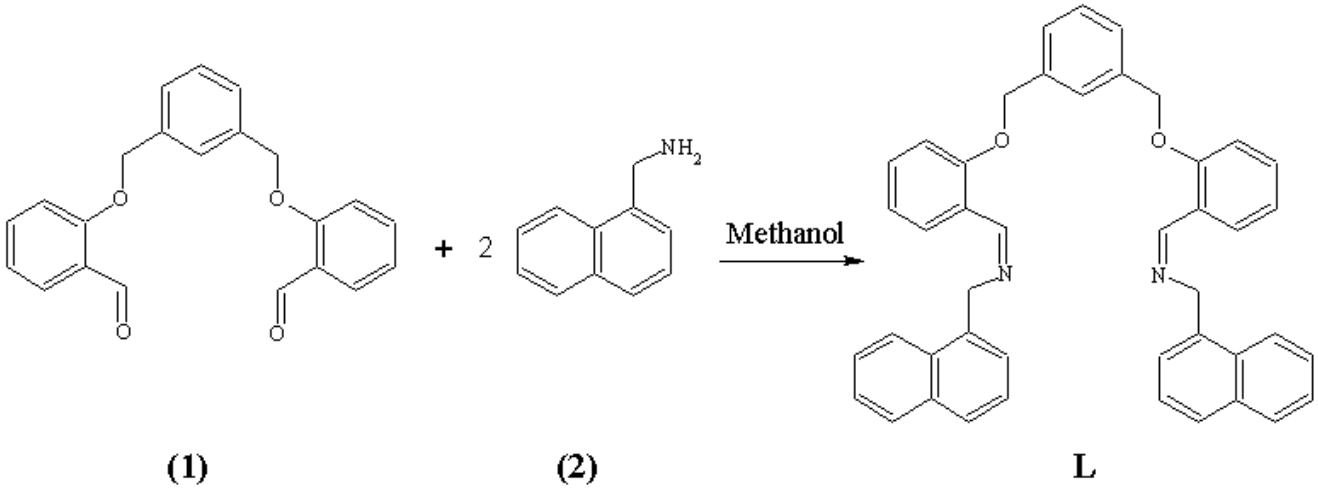
Introduction

The synthesis and characterisation of new fluorescence chemosensors has evolved rapidly in the last few years [1-5]. A fluorescence chemosensor is a compound that exhibits changes in its fluorescence properties upon interaction with an analyte. Fluorescence chemosensors have the potential to be highly selective even at very low concentrations of analyte [6]. The continuing research into the application of fluorescence probes has led to the development of numerous fluorescence systems based on restricting the rotation of imine (C=N) bonds by complexation of cations [7].

This paper describes the synthesis and characterisation of a new di-imine compound (L), which could potentially be used as fluorescence chemosensor due to its fluorescent properties. The compound has been prepared by classical Schiff-base reaction between 2,2'-[1,3-phenylenebis(methyleneoxy)]-

dibenzaldehyde (**1**) and the fluorescence probe 1-naphthylmethylamine (**2**)**.** The synthetic route to prepare L is depicted in Figure 1.

Figure 1. Schematic synthesis of L.



Experimental

2,2'-[1,3-phenylenebis(methyleneoxy)]dibenzaldehyde (**1**) was prepared following the method described previously [8], by reaction between salicylaldehyde, sodium hydroxide and 1,3-bis(bromo-methyl)benzene (2:2:1 ratio) in an ethanol/water solution (2:1 ratio). A solution of 2,2'-[1,3-phenylenebis(methyleneoxy)]dibenzaldehyde (**1**) (0.346 g), dissolved in methanol (50 mL) was added dropwise to a solution of 1-naphthylmethylamine (**2**) (0.157 mL) in methanol (50 mL). The resulting solution was gently refluxed with magnetic stirring for 4 h, during which the colour changed slowly from clear to pale yellow. The solution was then left to cool, whilst stirring, for 24 h. The solvent was then evaporated to ca. 10 mL to produce a yellow solid powder, stable in air, which was filtered off and characterised as L.

Yield: 67.6%.

MALDI-TOF-MS: *m/z* = 625 $[LH]^+$

^{1}H NMR ($CDCl_3$) δ (ppm) = 8.84 (s, 2H, N=C-H); 8.13–6.90 (m, C-H ar); 5.24 (s, 2H, N-CH); 5.09 (s, 4H, OCH_2).

Elemental analysis: calculated for $C_{44}H_{36}N_2O_2$ (624.76) C, 84.59%; H, 5.81%; N, 4.49%. Found: C, 84.10%; H, 5.81%; N, 4.55%.

IR (cm^{-1}) (**L**): 3100 (C-H, Ar), 1640 (C=N), 1620, 1600, 1520 and 1500 (C=C, Ar).

Uv-vis ($CHCl_3$), [**L**] = 1.0×10^{-5} M, λ_{max} 250 nm, 280 nm and 294 nm

Fluorescence Emission ($CHCl_3$); [**L**] = 1.0×10^{-5}: λ_{max} 340 nm (monomer) and 440 nm (excimer).

Acknowledgements

E. Bertolo thanks Canterbury Christ Church University Research Grant Fund for financial support. C. Lodeiro thanks University of Vigo INOU-ViCou K914 (Spain) and Scientific PROTEOMASS Association (Ourense-Spain) for financial support, and Xunta de Galicia for the Isidro Parga Pondal Research programme.

References

1 Lodeiro, C.; Capelo, J.L.; Mejuto, J.C.; Oliveira, E.; Santos, H.M.; Pedras, B.; Nuñez, C. Light and colour as analytical detection tools: A journey into the periodic table using polyamines to bio-inspired systems as chemosensors. *Chem. Soc. Rev.* **2010**, *39*, 2948-2976.

2 Lodeiro, C.; Pina, F. Luminescent and chromogenic molecular probes based on polyamines and related compounds. *Coordin. Chem. Rev.* **2009**, *253*, 1353-1385.

3 Bencini, A.; Lippolis, V. 1,10-phenanthroline: A versatile building block for the construction of ligands for various purposes. *Coordin. Chem. Rev.* **2010**, *254*, 2096-2180.

4 Mewis, R.E.; Archibald, S.J. Biomedical applications of macrocyclic ligand complexes. *Coordin. Chem. Rev.* **2010**, *254*, 1686-1712.

5 Pazos, E.; Vázquez, O.; Mascareñas, J.L.; Vázquez E.M. Peptide-based fluorescent biosensors. *Chem. Soc. Rev.* **2009**, *38*, 3348-3359.

6 Pedras, B.; Santos, H.M.; Fernades, L.; Covelo, B.; Tamayo, A.; Bertolo, E; Capelo, J.L.; Avilés, T.; Lodeiro. C. Sensing metal ions with twoazomethine-thiophene pincer ligands (NSN): Fluorescence and MALDI-TOF-MS applications. *Inorg. Chem. Commun.* **2007**, *10*, 925-929.

7 Liu, W.; Xu, L.; Sheng, R.; Wang, P.; Li, H.; Wu. S. A Water Soluble "Switching On" fluorescent Chemosenor of Selectivity to Cd^{2+}. *Org. Lett*. **2007**, *9*, 3829-3832.

8 Yson, M.J. Synthesis and characterisation of a N_2O_2 containing compound with potential application as a sensor for Cu(II) and Zu (II). BSc Thesis, Canterbury Christ Church University, 2007.