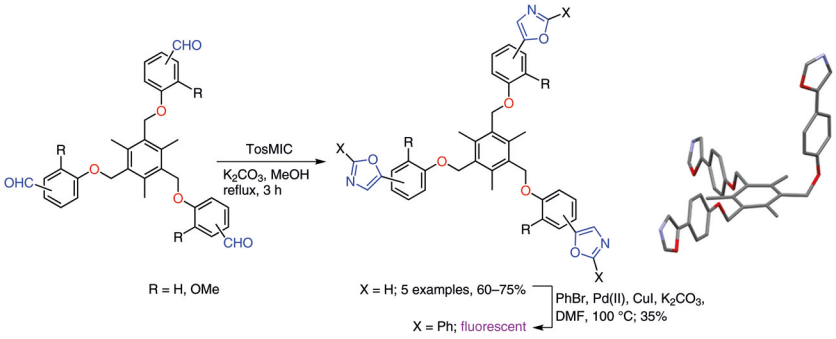
Synlett S. R. Shah et al. Letter

Conformationally Flexible C_3-Symmetric 1,3-Oxazoles as Molecular Scaffolds

Shailesh R. Shah[*a]
Ruchita R. Thakore[a]
Trupti A. Vyas[a]
Balasubramanian Sridhar[b]

[a] Department of Chemistry, Faculty of Science, The M. S. University of Baroda, Vadodara 390002, India
shailesh-chem@msubaroda.ac.in
[b] Indian Institute of Chemical Technology, Tarnaka, Hyderabad 500007, India

Dedicated to Professor Leo Paquette on the occasion of his 81st birthday



Received: 09.07.2015
Accepted after revision: 03.09.2015
Published online: 15.10.2015
DOI: 10.1055/s-0035-1560576; Art ID: st-2015-d0530-l

Abstract Flexible-arm, C_3-symmetric tris-oxazoles are synthesized for their applications in supramolecular chemistry and materials science. The C_3-symmetry is introduced starting from 1,3,5-trimethylbenzene and carrying out threefold reactions at each stage of the synthesis. The applicability of these tris-oxazoles is demonstrated by transforming a representative example into a highly fluorescent material. This is accomplished by conjugation with an aromatic moiety via palladium(0)-catalyzed direct arylation at C-2 of the oxazole. A unique molecular arrangement in the crystal structure is observed.

Key words C_3-symmetric molecules, 1,3-oxazoles, tris-aromatic aldehydes, van Leusen synthesis, fluorescent materials

Symmetry has always been attractive and is found widespread in Nature. Different C_3-symmetric compounds having a threefold rotational axis of symmetry have attracted significant attention,[1] not only for aesthetic reasons, but also due to the various unique properties they possess and the enormous potential in their applications in the fields of supramolecular chemistry,[2] catalysis,[3] dendrimer chemistry[4] and as new materials.[5]

C_3-Symmetric compounds with flexible podand groups have greater possibility of having complementary supramolecular interactions to bind with guest entities (Figure 1).[6] 1,3-Oxazoles are five-membered heteroaromatic azoles and have attracted plenty of attention in recent years due to their presence in natural products and the diverse bioactivities that they exhibit.[7] Although a number of C_3-symmetric compounds possessing various other heterocylic moieties have been reported in the literature,[8] flexibly disposed C_3-symmetric oxazole-containing compounds have not been reported as yet.[9] On the other hand, oxazoles with conjugated aromatic substitution at positions 2 and 5 result in highly fluorescent materials.[10] Such fluorescent materials have found valuable applications in the fields of biosensing, supramolecular chemistry and metal-ion detection and recognition.[11]

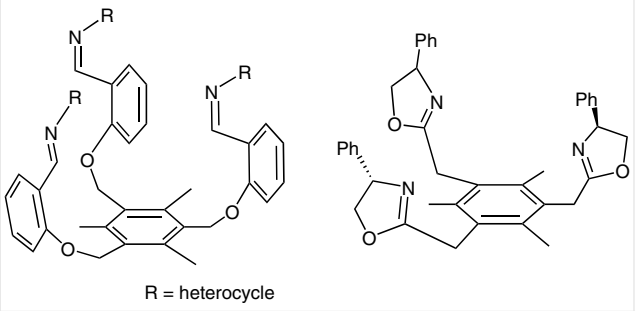


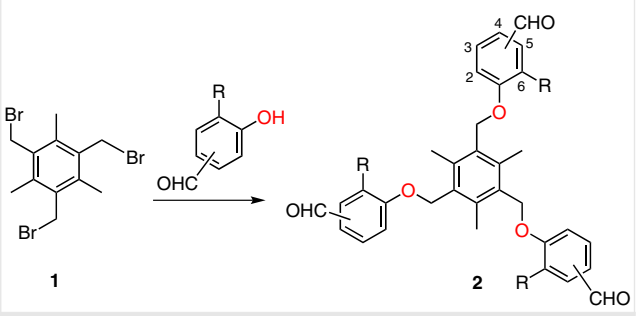
Figure 1 Representative flexi-arm tripodal host molecules[6a,c]

In continuation of our interest in C_3-symmetric compounds[12] in biologically potent compounds[13] and in oxazole chemistry,[14] we report herein the synthesis and study of flexible tripodal 1,3-oxazoles by employing 1,3,5-trimethylbenzene as the substrate for transformation into C_3-symmetric scaffolds.

In an early attempt in this direction, we were the first to synthesize and characterize C_3-symmetric aryl ethers with formyl functionalities as diverse synthetic building blocks for a variety of C_3-symmetric compounds.[12a] These building blocks provided us with flexible tripodal trifunctional compounds that could be employed for the construction of various molecules with tris-heterocyclic pendant groups for a range of diverse applications.

Accordingly, in the present work, these tris-aldehydes[12a,15] have been transformed into tris-1,3-oxazoles via a single-step, threefold reaction protocol. The required C_3-symmetric aldehydes **2** were prepared[12a] in good yields starting from 1,3,5-tris(bromomethyl)-2,4,6-trimethylben-

zene (**1**)[16] by coupling with different phenolic aldehydes, and were characterized from spectroscopic and elemental analyses[12a,17,18] (Scheme 1, Table 1).



Scheme 1 Synthesis of tris-aromatic aldehydes **2a–e**. *Reagents and conditions*: K_2CO_3, acetone, r.t., 3 h.

Table 1 Synthesis of C_3-Symmetric Tris-aromatic Aldehydes **2a–e**

Product	CHO Position[a]	R	Yield (%)[b]	Mp (°C)[c]
2a[12a]	4-	H	82	194
2b[15c]	3-	H	80	190
2c[15b]	2-	H	75	184
2d	4-	OMe	80	212
2e[18]	2-	OMe	70	208

[a] Position of the CHO group; refer to Scheme 1.
[b] Yield of isolated product.
[c] Melting points were recorded in open capillary tubes and are uncorrected.

The van Leusen reagent, *p*-toluenesulfonylmethyl isocyanide (TosMIC), is a useful reagent for converting a formyl group into a 1,3-oxazole in a single step.[19] This reagent was successfully employed for the threefold transformation of the tris-aromatic aldehydes **2** into the desired 5-substituted tris-oxazoles **3** in good yields (Scheme 2,Table 2).[20] The newly synthesized tris-oxazoles were characterized by various analytical techniques and their symmetry was reflected in their simple NMR spectra.[17,20]

The tris-oxazole **3e** has the peripheral aromatic rings substituted with an oxazole at the *ortho*-position with respect to the ether linkage on one side and a methoxy group on the other side. The complementary orientation of the podands can result in the product attaining a molecular container shape (Figure 2).

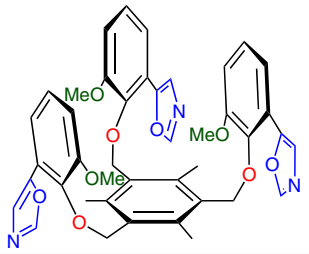


Figure 2 Tris-oxazole **3e** depicted as a molecular container

Crystals of oxazole **3a** suitable for single crystal X-ray diffraction analysis were obtained by slow evaporation of an ethyl acetate solution. The triclinic crystals of the tris-oxazole (Figure 3)[21] show a structure in which one of the podand arms is orientated at a right angle to the central ring, unlike the other two podand arms. The crystal packing is governed by C–H·O interactions. Two sets of centrosymmetric dimers are formed by C–H·O interactions: C19–

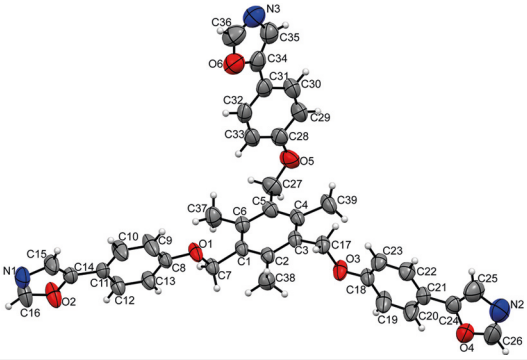
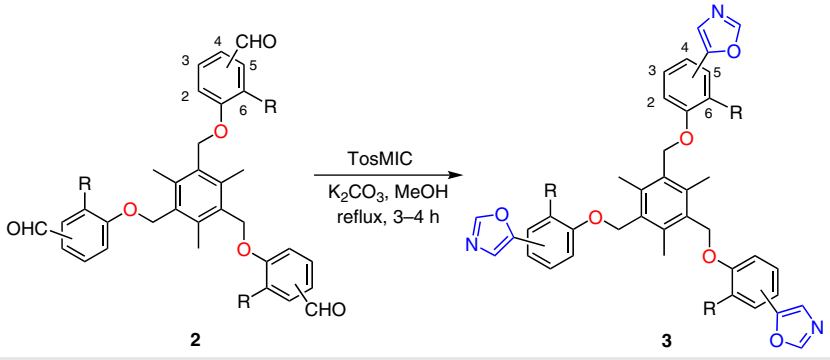
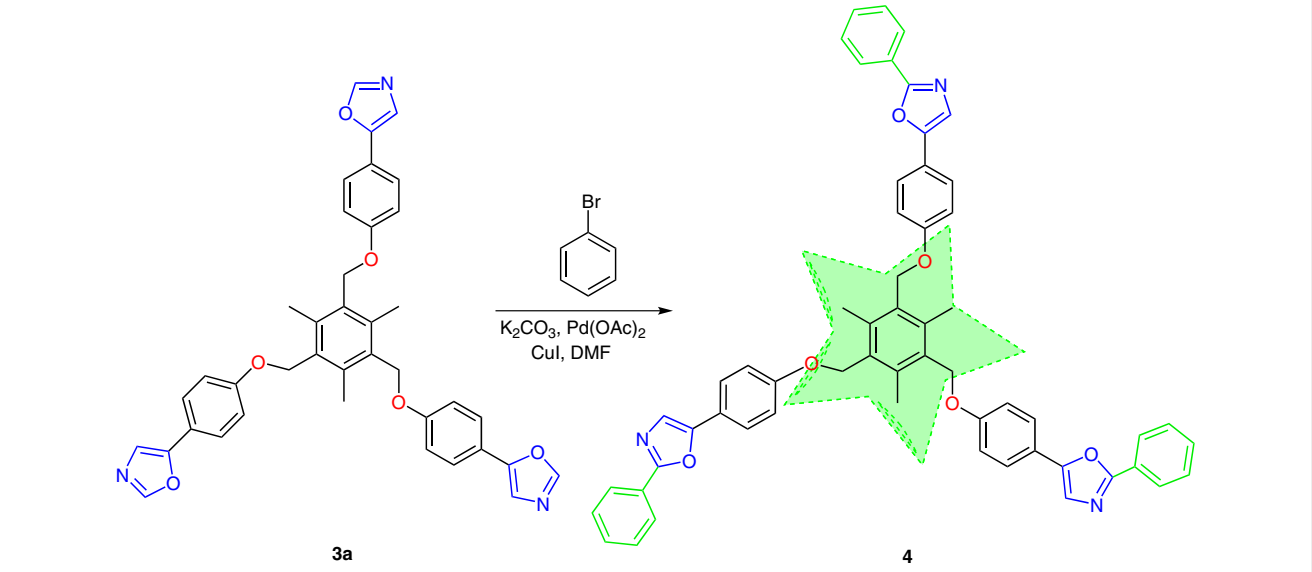


Figure 3 Single crystal X-ray (ORTEP) diagram of compound **3a**



Scheme 2 Synthesis of 1,3,5-tris(1,3-oxazoles) **3a–e**



Scheme 3 Pd(0)-catalyzed direct C–H arylation at C-2 of 1,3-oxazole **3a**

H19…O2 [–x, –y + 2, –z + 1] and C23–H23…O1 [–x + 1, –y + 2, –z + 1]. These intermolecular interactions including C–H…π-cloud (central ring) interactions result in a zigzag molecular pattern (Figure 4).

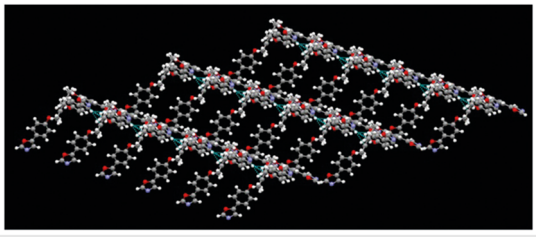


Figure 4 Molecular arrangement in the crystal packing of compound **3a**

As 2,5-diaryl-1,3-oxazoles are excellent fluorescent probes,[10] and to demonstrate the applications of the newly synthesized terminal tris-oxazoles, the reactive, free C-2 position of heterocycle **3a** was utilized for the transformation into a fluorescent material. Palladium(0)-catalyzed direct oxazole C–H functionalization was carried out in *N*,*N*-dimethylformamide in the presence of copper(I) iodide (CuI) and potassium carbonate with heating,[22] resulting in the highly fluorescent product **4**[23] (Scheme 3).

The resulting tris-2-phenyl-5-substituted-1,3-oxazole **4** showed a strong absorption at 316 nm and strong photoluminescence at 430 nm (Figure 5), as a result of which its solution was visibly fluorescent when exposed to UV radiation (Figure 5, inset).

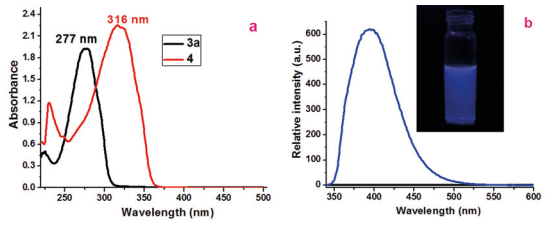


Figure 5 (a) The absorption spectra of **3a** and phenyl-conjugated oxazole **4**. (b) The emission spectrum of a solution of **4** in dichloromethane (10^{-5} M)

The C_3-symmetric oxazoles **3a**–**e** were screened for anticancer activity against 60 different cancer cell lines by the National Cancer Institute at the National Institutes of Health (USA). Among them, tris-2-(5-oxazolyl)-6-methoxy compound **3e** was found to show the highest activity against a number of different cell lines.[17] This could be due to the closely placed heteroatoms in **3e** offering complementary binding sites (Figure 2).

In conclusion, several new, flexible, terminal oxazole-containing C_3-symmetric compounds have been synthesized from the corresponding tris-aromatic aldehydes and have been characterized. The X-ray crystal structure of one of the tris-oxazoles (**3a**) exhibits a unique crystal packing of the molecules in a zigzag fashion. The oxazole scaffold **3a** was employed for palladium-mediated coupling resulting in a conjugated fluorescent material.

Table 2 Synthesis of C_3-Symmetric 1,3,5-Tris(1,3-oxazoles) **3a–e**[a]

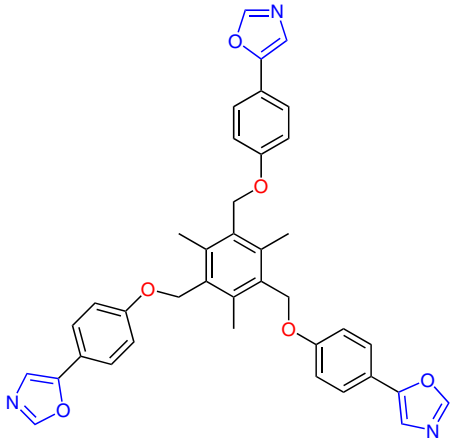
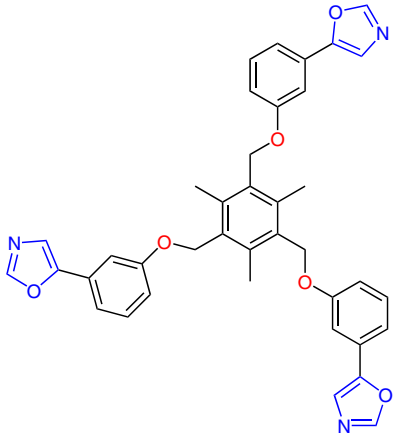
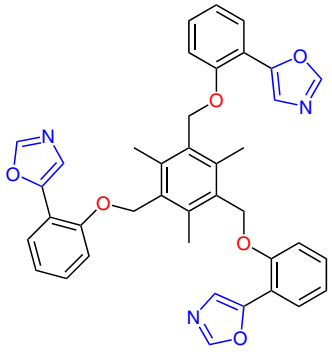
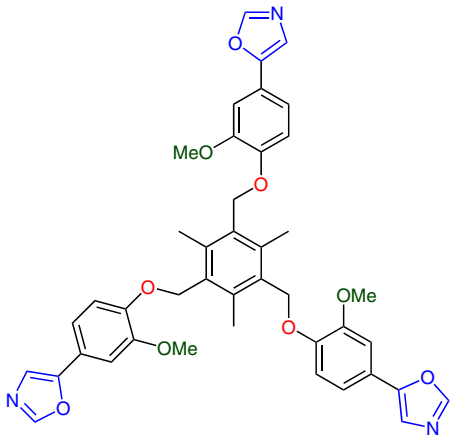
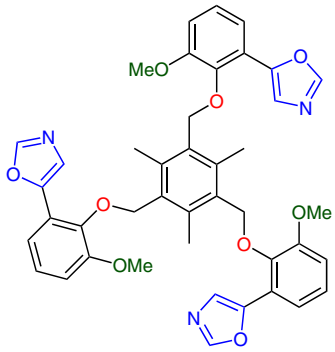
Product	Structure	Yield (%)[b]	Mp (°C)[c]
3a		75	195
3b		68	210
3c		65	205

Table 2 (continued)

Product	Structure	Yield (%)[b]	Mp (°C)[c]
3d		70	200
3e[20]		60	210

[a] Overall structure is shown in Scheme [2].
[b] Yield of isolated product.
[c] Melting points were recorded in open capillary tubes and are uncorrected.

Acknowledgment

Financial support in the form of a BSR fellowship from UGC (New Delhi) to R.R.T. is gratefully acknowledged. We thank Dr. Balaram S. Takale, AIMR, Tohoku University for useful discussions. Mass spectrometric analysis performed at the Zydus Research Centre, Ahmedabad, is gratefully acknowledged. The 400 MHz NMR facility was supported by a DST-FIST grant to the Department. The NCI at NIH, USA is acknowledged for the in vitro anticancer screening.

Supporting Information

Supporting information for this article is available online at http://dx.doi.org/10.1055/s-0035-1560576.

References and Notes

(1) (a) Moberg, C. *Angew. Chem. Int. Ed.* **1998**, *37*, 248. (b) Gibson, S. E.; Castaldi, M. P. *Angew. Chem. Int. Ed.* **2006**, *45*, 4718. (c) Gibson, S. E.; Castaldi, M. P. *Chem. Commun.* **2006**, 3045.

(2) (a) Dash, J.; Trawny, D.; Rabe, J. P.; Reissing, H. U. *Synlett* **2015**, *26*, 1486. (b) Shokri, A.; Deng, S. H. M.; Wang, X. B.; Kass, S. R. *Org. Chem. Front.* **2014**, *1*, 54. (c) Wang, X.; Hof, F. *Beilstein J. Org. Chem.* **2012**, *8*, 1. (d) Dai, Z.; Canary, J. W. *New J. Chem.* **2007**, *31*, 1708. (e) Nativi, C.; Cacciarini, M.; Francesconi, O.; Vacca, A.; Moneti, G.; Ienco, A.; Roelens, S. *J. Am. Chem. Soc.* **2007**, *129*, 4377. (f) Kuswandi, B.; Nuriman; Verboom, W.; Reinhoudt, D. N. *Sensors* **2006**, *6*, 978.

(3) (a) Bera, M.; Ghosh, T. K.; Akhuli, B.; Ghosh, P. *J. Mol. Catal. A: Chem.* **2015**, *408*, 287. (b) Murai, K.; Nakamura, A.; Matsushita, T.; Shimura, M.; Fujioka, H. *Chem. Eur. J.* **2012**, *18*, 8448. (c) Moorthy, J. N.; Saha, S. *Eur. J. Org. Chem.* **2010**, 6359. (d) Liu, Y. R.; He, L.; Zhang, J.; Wang, X.; Su, C. Y. *Chem. Mater.* **2009**, *21*, 557.

(4) (a) Chabre, Y. M.; Papadopoulos, A.; Arnold, A. A.; Roy, R. *Beilstein J. Org. Chem.* **2014**, *10*, 1524. (b) Gutièrrez-Abad, R.; Illa, O.; Ortuño, R. M. *Org. Lett.* **2010**, *12*, 3148. (c) Pérez, E. M.; Illescas, B. M.; Herranz, M. A.; Martin, N. *New J. Chem.* **2009**, *33*, 228.

(5) (a) Jana, A.; Paikar, A.; Bera, S.; Maity, S.; Haldar, D. *Org. Lett.* **2014**, *16*, 38. (b) Prabhu, D. D.; Sivadas, A. P.; Das, S. *J. Mater. Chem. C* **2014**, *2*, 7039. (c) Huang, H.; Fu, Q.; Zhuang, S.; Liu, Y.; Wang, L.; Chen, J.; Ma, D.; Yang, C. *J. Phys. Chem. C* **2011**, *115*, 4872. (d) García-Frutos, E. M.; Omenat, A.; Barberá, J.; Serrano, J.

L.; Gómez-Lor, B. *J. Mater. Chem.* **2011**, *21*, 6831. (e) Ryu, M. H.; Choi, J. W.; Kim, H. J.; Park, N.; Cho, B. K. *Angew. Chem. Int. Ed.* **2011**, *123*, 5855. (f) Yelamaggad, C. V.; Achalkumar, A. S.; Rao, D. S. S.; Prasad, S. K. *J. Org. Chem.* **2009**, *74*, 3168.

(6) (a) Bharadwaj, V. K.; Sharma, H.; Kaur, N.; Singh, N. *New J. Chem.* **2013**, *37*, 4192. (b) Turner, D. R.; Paterson, M. J.; Steed, J. W. *J. Org. Chem.* **2006**, *71*, 1598. (c) Kim, J.; Kim, S. G.; Seong, H. R.; Ahn, K. H. *J. Org. Chem.* **2005**, *70*, 7227. (d) Ihm, H.; Yun, S.; Kim, H. G.; Kim, J. K.; Kim, K. S. *Org. Lett.* **2002**, *4*, 2897.

(7) (a) Jin, Z. *Nat. Prod. Rep.* **2013**, *30*, 869. (b) Wright, A. E.; Botelho, J. C.; Guzmán, E.; Harmody, D.; Linley, P.; McCarthy, P. J.; Pitts, T. P.; Pomponi, S. A.; Reed, J. K. *J. Nat. Prod.* **2007**, *70*, 412. (c) Pingali, H.; Jain, M.; Shah, S.; Patil, P.; Makadia, P.; Zaware, P.; Sairam, K. V. V. M.; Jamili, J.; Goel, A.; Patel, M.; Patel, P. *Bioorg. Med. Chem. Lett.* **2008**, *18*, 6471. (d) Makadia, P.; Shah, S. R.; Pingali, H.; Zaware, P.; Patel, D.; Pola, S.; Thube, B.; Priyadarshini, P.; Suthar, D.; Shah, M.; Giri, S.; Trivedi, C.; Jain, M.; Patel, P.; Bahekar, R. *Bioorg. Med. Chem.* **2011**, *19*, 771.

(8) (a) Vila-Vicosa, D.; Francesconi, O.; Machuqueiro, M. *Beilstein J. Org. Chem.* **2014**, *10*, 1513. (b) Koch, N.; Mazik, M. *Synthesis* **2013**, *45*, 3341. (c) Ingale, S. A.; Seela, F. *J. Org. Chem.* **2012**, *77*, 9352. (d) Tanabe, K.; Suzui, Y.; Hasegawa, M.; Kato, T. *J. Am. Chem. Soc.* **2012**, *134*, 5652. (e) Singh, N.; Jang, D. O. *Org. Lett.* **2007**, *9*, 1991.

(9) For the only previous report on rigid C_3-symmetric oxazoles, see: Kotha, S.; Shah, V. R. *Synthesis* **2007**, *23*, 3653.

(10) (a) Mahuteau-Betzer, F.; Piguel, S. *Tetrahedron Lett.* **2013**, *54*, 3188. (b) Silva, D. L.; De Boni, L.; Correa, D. S.; Costa, S. C. S.; Hidalgo, A. A.; Zilio, S. C.; Canuto, S.; Mendonca, C. R. *Opt. Mater.* **2012**, *34*, 1013. (c) Park, H. J.; Lim, C. S.; Kim, E. S.; Han, J. H.; Lee, T. H.; Chun, H. J.; Cho, B. R. *Angew. Chem. Int. Ed.* **2012**, *51*, 2673. (d) Krishnamurthy, N. V.; Reddy, A. R.; Bhudevi, B. *J. Fluoresc.* **2008**, *18*, 29.

(11) (a) Yeung, M. C. L.; Yam, V. W. W. *Chem. Soc. Rev.* **2015**, *44*, 4192. (b) Cotruvo, J. A. Jr.; Aron, A. T.; Ramos-Torres, K. M.; Chang, C. J. *Chem. Soc. Rev.* **2015**, *44*, 4400. (c) Carter, K. P.; Young, A. M.; Palmer, A. E. *Chem. Rev.* **2014**, *114*, 4564. (d) Domaille, D. W.; Que, E. L.; Chang, C. J. *Nat. Chem. Biol.* **2008**, *4*, 168.

(12) (a) Vyas, T. A. *Ph.D. Dissertation*; The M. S. University of Baroda: India, **2004**. (b) Mehta, G.; Panda, G.; Shah, S. R.; Kunwar, A. C. *J. Chem. Soc., Perkin Trans. 1* **1997**, 2269. (c) Mehta, G.; Shah, S. R.; Ravikumar, K. *J. Chem. Soc., Chem. Commun.* **1993**, 1006. (d) Mehta, G.; Shah, S. R. *Indian J. Chem., Sect. B: Org. Chem. Incl. Med. Chem.* **1993**, *32*, 774.

(13) (a) Jadav, P.; Bahekar, R.; Shah, S. R.; Patel, D.; Joharapurkar, A.; Jain, M.; Sairam, K. V. V. M.; Singh, P. *Bioorg. Med. Chem. Lett.* **2014**, *24*, 1918. (b) Patel, D.; Jain, M.; Shah, S. R.; Bahekar, R.; Jadav, P.; Shah, K.; Joharapurkar, A.; Shaikh, M.; Sairam, K. V. V. M. *Med. Chem.* **2013**, *9*, 660. (c) Jadav, P.; Bahekar, R.; Shah, S. R.; Patel, D.; Joharapurkar, A.; Samadhan, K.; Jain, M.; Shaikh, M.; Sairam, K. V. V. M. *Bioorg. Med. Chem. Lett.* **2012**, *22*, 3516.

(14) Shah, S. R.; Navathe, S. S.; Dikundwar, A. G.; Guru Row, T. N.; Vasella, A. T. *Eur. J. Org. Chem.* **2013**, 264.

(15) (a) Bray, D. J.; Lindoy, L. F.; McMurtrie, J. C. *Acta. Crystallogr., Sect. E* **2004**, *60*, 6. (b) Samy, A. N.; Alexander, V. *Dalton Trans.* **2011**, *40*, 8630. (c) Cheng, F.; Chen, J.; Wang, F.; Tang, N.; Chen, L. *Z. Anorg. Allg. Chem.* **2011**, *637*, 766.

(16) van der Made, A. W.; van der Made, R. H. *J. Org. Chem.* **1993**, *58*, 1262.

(17) See the Supporting Information for further details.

(18) **1,3,5-Tris[(2-formyl-6-methoxy)phenyloxymethyl)-2,4,6-trimethylbenzene (2e); Typical Procedure**
To a stirred solution of a 2-hydroxy-3-methoxybenzaldehyde (0.23 g, 1.5 mmol) in acetone was added K_2CO_3 (0.62 g, 4.5 mmol) followed by 1,3,5-tris(bromomethyl)-2,4,6-trimethylbenzene (**1**) (0.2 g, 0.5 mmol). The resulting mixture was stirred at r.t. for 3 h. On completion of the reaction (TLC), the acetone was evaporated to a small volume followed by the addition of cold H_2O. The solid thus obtained was filtered and recrystallized from EtOH to give pure tris-aromatic aldehyde **2e**.
Yield: 0.18 g (70%); white solid; mp 208 °C. IR (KBr): 2841, 1693, 1583, 1481, 1359, 1265, 1249, 1209 cm^{-1}. ^1H NMR (200 MHz, $CDCl_3$): δ = 2.45 (s, 9 H, $-CH_3$), 3.96 (s, 9 H, $-OCH_3$), 5.45 (s, 6 H, $-OCH_2-$), 7.12–7.20 (m, 6 H), 7.39 (dd, J_1 = 7.2 Hz, J_2 = 2.0 Hz, 3 H), 10.15 (s, 3 H, –CHO). ^{13}C NMR (50 MHz, $CDCl_3$): δ = 16.0 ($-CH_3$), 56.0 ($-OCH_3$), 77.0 ($-OCH_2$), 118.1, 119.0, 123.2, 129.9, 132.1, 140.3, 151.4, 153.6, 190.9 (–CHO). Anal. Calcd for $C_{36}H_{36}O_9$: C, 70.57; H, 5.92. Found: C, 69.91; H, 6.79.

(19) van Leusen, A. M.; Hoogenboom, B. E.; Siderius, H. *Tetrahedron Lett.* **1972**, 2369.

(20) **1,3,5-Tris[6-methoxy-2-(1,3-oxazol-5-yl)phenyloxymethyl]-2,4,6-trimethylbenzene (3e); Typical Procedure**
To a two-necked round-bottomed flask were added tris-aldehyde **2e** (0.1 g, 0.16 mmol), *p*-toluenesulfonylmethyl isocyanide (TosMIC) (0.13 g, 0.65 mmol), K_2CO_3 (0.16 g, 1.2 mmol) and MeOH. The resulting mixture was heated at reflux temperature for 3–4 h. On completion of the reaction (TLC), the MeOH was evaporated under reduced pressure and the residue was purified by column chromatography on silica (EtOAc–hexanes, 6:4 to 8:2) to give the corresponding tris-1,3-oxazole **3e**.
Yield: 0.07 g (60%); white solid; mp 210 °C. IR (KBr): 2939, 2834, 1589, 1560, 1503, 1471, 1265 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$): δ = 2.45 (s, 9 H, $-CH_3$), 3.94 (s, 9 H, $-OCH_3$), 5.31 (s, 6 H, $-OCH_2-$), 6.97 (dd, J_1 = 8.2 Hz, J_2 = 1.2 Hz, 3 H), 7.13 (t, J = 8.0 Hz, 3 H), 7.30 (s, 3 H, oxazole *H*), 7.35 (dd, J_1 = 8.2 Hz, J_2 = 1.2 Hz, 3 H), 7.87 (s, 3 H, –N=CH–, oxazole *H*). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 16.1 ($-CH_3$), 55.9 ($-OCH_3$), 70.0 ($-OCH_2$), 112.4, 118.2, 122.1, 123.9, 125.7, 132.5, 139.5, 145.1, 153.1. HRMS (Q-TOF MS ES+): *m*/*z* $[M]^+$ calcd for $C_{42}H_{39}N_3O_9$: 729.2686; found: 729.2677.

(21) Crystal data for compound **3a** (CCDC 1403715): $C_{39}H_{33}N_3O_6$ (M = 639.68): triclinic space group *P*-1 (no. 2), a = 11.0751(12) Å, b = 11.1638(12) Å, c = 13.9139(15) Å, α = 100.558(2)°, β = 108.883(2)°, γ = 98.899(2)°, V = 1557.3(3) Å^3, Z = 2, T = 294.15 K, μ(MoKα) = 0.093 mm^{-1}, D_{calc} = 1.364 g/mm^3, 18425 reflections measured (3.2 ≤ 2θ ≤ 56.1), 7290 unique (R_{int} = 0.0235) which were used in all calculations. The final R_1 was 0.0659 [>2σ(I)] and wR_2 was 0.1933 (all data).

(22) For similar coupling under microwave conditions, see: Besselievre, F.; Mahuteau-Betzer, F.; Grierson, D. S.; Piguel, S. *J. Org. Chem.* **2008**, *73*, 3278.

(23) **1,3,5-Tris[4-(2-phenyl-1,3-oxazol-5-yl)phenyloxymethyl]-2,4,6-trimethylbenzene (4)**
To a two-necked round-bottomed flask were added compound **3a** (0.1 g, 0.19 mmol), bromobenzene (0.14 g, 0.86 mmol), K_2CO_3 (1.6 g, 1.15 mmol), $Pd(OAc)_2$ (6 mg, 15 mol%), CuI (0.10 g, 0.57 mmol) and DMF (4 mL). The resulting mixture was degassed and then heated to 150 °C and stirred under an N_2 atm for 3 h. On completion of the reaction (TLC), the solids were removed by filtration through Celite® followed by washing with CH_2Cl_2. The filtrate and washings were evaporated under vacuum and the residue purified by column chromatography on silica (EtOAc–hexanes, 3:7) to afford tris(2-phenyl-1,3-oxazol-5-yl) **4**.
Yield: 0.05 g (35%); white solid; mp: 187 °C. IR (KBr): 2923, 1612, 1499, 1242, 1176 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$):

δ = 2.52 (s, 9 H, $-CH_3$), 5.20 (s, 6 H, $-OCH_2-$), 7.13 (d, *J* = 8.8 Hz, 6 H), 7.37 (s, 3 H, oxazole *H*), 7.50 (d, *J* = 7.6 Hz, 9 H), 7.72 (d, *J* = 9.2 Hz, 6 H), 8.12 (dd, J_1 = 7.8 Hz, J_2 = 2.0 Hz, 6 H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 16.0 ($-CH_3$), 65.1 ($-OCH_2$), 115.1, 121.2, 122.1, 125.8, 126.1, 127.5, 128.8, 130.1, 131.6, 139.5, 151.2 and 159.3 (oxazole carbons), 160.6 (Ar–O–). HRMS (Q-TOF MS ES+): *m*/*z* $[M + H]^+$ calcd for $C_{57}H_{46}N_3O_6$: 868.3387; found: 868.2813; *m*/*z* $[M + Na]^+$ calcd for $C_{57}H_{45}N_3O_6Na$: 890.3206; found: 890.2594.