Title:	Wet process feasible novel fluorene-based molecular hole transporting layer for phosphorescent organic light emitting diodes
Authors:	De, Joydip (/jspui/browse?type=author&value=De%2C+Joydip) Pal, Santanu (/jspui/browse?type=author&value=Pal%2C+Santanu)
Keywords:	Wet process feasible fluorene-based molecular transporting
Issue Date:	2021
Publisher:	Elsevier
Citation:	Optical Materials, 120, 111410.
Abstract:	Solution processable hole transporting materials (HTMs) are indispensable component for the cost-effective and large-area roll-to-roll fabrication of organic light emitting diodes (OLEDs). Hole transport layers should display high triplet energy, good hole injection properties along with potential electron blocking capability. In this paper, we report a series of novel fluorene-based HTMs, 9,9-diethyl-2,7-bis(2-(trifluoromethyl)phenyl)-9H-fluorene (3), 9,9-diethyl-2,7-bis(3-(trifluoromethyl)phenyl)-9H-fluorene (4) and 9,9- diethyl-2,7-bis(4-(trifluoromethyl)phenyl)-9H-fluorene (5) containing symmetrical and asymmetrical substitution of trifluoromethyl pendants at different positions. The synthesized HTMs have an exceptional solubility in common organic solvents such as THF (tetrahydrofuran), o-Xylene, etc. and possess good thermal stability to form morphologically stable films. The suitable molecular energy level alignment (HOMO-LUMO) for barrier free injection, adequate ionization potential (6.12, 6.20, and 6.23 eV) and high triplet energies (3.12,3.17, and 3.13 eV) for compound 3, 4, and 5, these suitable characteristics promote materials performance as a good hole transporting layer (HTL). Solution-processed yellow phosphorescent OLEDs fabricated by utilizing these HTMs with a conventional yellow emitter Iridium (III)bis (4-phenylthieno [3,2-c]pyridinato-N,C2′)acetylacetonate (PO-01) doped in 4,4′-bis(N-carbazolyl)-1,1′-biphenyl (CBP) host. The best device with molecule 4 showed an improvement of 54 % in current efficiency (CE) from 23.3 to 35.8 cd/A and 14 % in external quantum efficiency (EQE) from 11.3 to 12.9 %, compared to reference device containing N, N′-Bis(naphthalen-1-yl)-N,N′-bis(phenyl)benzidine (NPB) as HTL. Compounds 3 and 5 based devices also showed a competitive performance with the reference device. The effect of solvent was also studied. These outcomes recommend that this type of solution processable HTMs will be promising contender for high-efficiency OLED devices.
Description:	Only IISERM authors are available in the record.
URI:	https://doi.org/10.1016/j.optmat.2021.111410 (https://doi.org/10.1016/j.optmat.2021.111410) http://hdl.handle.net/123456789/4940 (http://hdl.handle.net/123456789/4940)
Appears in Collections:	Research Articles (/jspui/handle/123456789/9)

Files in This Item:

File	Description	Size	Format	
Need To Add…Full Text_PDF (/jspui/bitstream/123456789/4940/1/Need%20To%20Add%e2%80%a6Full%20Text_PDF)	Only IISERM authors are available in the record.	15.36 kB	Unknown	View/Open (/jspui/b

Show full item record (/jspui/handle/123456789/4940?mode=full)

(/jspui/handle/123456789/4940/statistics)