Title:	Blue Luminescent Organic Light Emitting Diode Devices of a New Class of Star-Shaped Columnar Mesogens Exhibiting π–π Driven Supergelation
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Keywords:	Organic light emitting diodes (OLED) Atomic force microscopy Electroluminescence Electronic equipment Scanning electron microscopy X ray scattering
Issue Date:	2018
Publisher:	American Chemical Society
Citation:	Journal of Physical Chemistry C, 122(41), pp. 23659-23674
Abstract:	Five new, star-shaped compounds containing a central oligo(phenylenevinylene) core carrying six alkoxy chains were synthesized, and with varying alkyl chains the changes in their supramolecular assembly were explored by small and wide-angle X-ray scattering (SAXS/WAXS) studies. For the shortest peripheral alkoxy chain (3.1; R = 3,7-dimethyl octyl) lamellar stacking was favored, whereas with increasing the alkoxy chain length (3.2, 3.3, 3.4, and 3.5; n-C12H25, n-C14H29, n-C16H33, n-C18H35) columnar rectangular (Colr) assembly was observed. The compound with branched peripheral chains (3.1) with lamellar assembly did not exhibit organogelation, but four other compounds (3.2, 3.3, 3.4 and 3.5) showed the ability to gelate in nonpolar solvents at a lower concentration even in less than 1 wt % (qualifying it as a supergelator), possibly due to their existence in the Colr packing having strong π–π interactions. This occurrence is less observed, in comparison to previous reports where supergelation happened mostly via H-bonding interactions. The hierarchical self-assembly of gels was investigated using transmission electron microscopy, scanning electron microscopy, atomic force microscopy, and X-ray diffraction studies. Interestingly, Colr packing was retained even in the gel state also. Rheological measurements performed on the samples displayed mechanical robusticity of these gels. All the compounds showed blue luminescence in solution as well as in thin-film states. The electroluminescent properties of the compound 3.3 were examined as emissive layers in organic light emitting diodes (OLEDs). It was explored by fabricating in OLED devices either as a host or dopant-emitters in the 4,4′-bis(N-carbazolyl)-1,1′-biphenyl host with different concentrations 1, 3, 5, and 7 wt %. The device fabricated with 1 wt % revealed the best electroluminescence performance with maximum luminescence, current efficiency, power efficiency, and external quantum efficiency.
Description:	Only IISERM authors are available in the record. Sarkar, Ishan
URI:	https://pubs.acs.org/doi/10.1021/acs.jpcc.8b05811 (https://pubs.acs.org/doi/10.1021/acs.jpcc.8b05811) http://hdl.handle.net/123456789/1759 (http://hdl.handle.net/123456789/1759)
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