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Preparation of new hyperbranched polymer based on TADF for OLED application

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Due to many benefits of Organic Light-Emitting diodes (OLEDs), and their ability to be extended to electronic products, commercial fields, transport, industrial controller, and medical field the performance of OLEDs has been improved speedily over the last three decades. Therefore, this project aims to explore an efficient way to reduce the manufacturing cost of the luminescent layer material and rise its suitability. Due to the low cost, simple confession, increased manufacture efficiency, and commercial cost, the solution processing to fabricate the OLED device has become the focus of research. PLEDs based on traditional fluorescent materials have generally restricted external quantum efficiencies (EQEs) around 5% because of spin statistic rules, which greatly limit them comprehensive application. Furthermore, by simultaneously using singlet and triplet excitons by Intersystem Crossing (ISC), the Internal Quantum Efficiency (IQE) of PLED devices that include organometallic phosphors is almost 100%.6 However, the rare and expensive noble metals, such as Ir or Pt, are common components in heavy-metal complexed phosphorescent materials.

Because of the rarity of these minerals, the devices generated are consequently expensive, prompting the quest for less priced alternatives. Thermally Activated Delayed Fluorescence (TADF) OLEDs are potential options, as the IQE is theoretically could be able to collect both singlet and triplet excitons. The Reverse Inter System Crossing (RISC) requires pure organic molecules, which are relatively inexpensive.6 Due to its high triplet energy and good hole-transporting property, this study proposes making the host molecule (mCP molecule) into a hyperbranched polymer and used that through solution proceeding as a host system to TADF molecules. As a result, we can configure our organic light emitting devices in a much cheaper way with a high efficiency. In this project, the HOMO polymer must be made first and examine its properties as a host and then later add in other functional group to increase its efficiency as a host material. The chemical purity of all the compounds were investigated further using 1H-NMR, 13C-NMR, elemental analysis and mass spectrometry techniques. To establish the thermal properties, optical and electrochemical properties, Thermal Gravimetric Analysis (TGA), Ultraviolet-Visible spectroscopy (UV), and Gel Permeation Chromatography (GPC) were also used to examine the resulting hyperbranched polymers.

Biography

Nujud Alqahtani, Ph.D. student at the university of Sheffield, organic chemistry, UK, was born in Saudi Arabia. She obtained her bachelor's degree in chemistry science in 2005 from Najran college, Saudi Arabia. She was awarded the degree of master of scientific studies (chemistry) at university of New England- 2011, Australia. In 2013 she was authorizing as a lecturer at King Khalid university, chemistry department, teaching various courses such as organic compounds synthesis, physical chemistry, material chemistry.

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