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Semiconducting Polyimides for Organic Nanoelctronics

Youngkyoo Kim

Department of Physics, Blackett Laboratory, Imperial College London
Prince Consort Road, London SW7 2BW, UK

Organic nanoelectronics is an emerging new technology that features combining nanotechnology and organic electronics, which is highlighted owing to its great potential of controlling nano/molecular level electronic processes eventually. The example of organic nanoelectronics applications includes organic light-emitting device/display (OLED), organic solar cell (OSC), organic field effect transistor (OFET), organic laser device (OLD), organic memory device (OMD), organic bioelectronic device (OBED), and single molecule device (SMD). Among these many applications OLED is the first to be commercialized though its long time reliability still partly lags behind the standard commercial requirement, which is attributed to the thermal and geometrical instability of organic nanolayers in devices upon electron transport process during device operation. In order to overcome this drawback of organic nanolayers, we have introduced semiconducting polyimides (SPI), which are stable above 200°C and exhibits good film-forming property, to make hybrid OLED (HOLED). The first generation of SPI was made by incorporating triarylamine derivatives into the polymer main chain, leading to a *p*-type semiconductor. This SPI has particularly strong merit in applications since its nanolayers can be fabricated by either wet-process (using polymer solutions) or dry-process (using vapor evaporation of corresponding monomers in vacuum chamber). In this talk, basic synthesis of several p-type SPIs and their application to green and blue HOLEDs will be presented with suggesting future directions.