

Photoluminescence quantum efficiency of ultraviolet emitting polymeric semiconductors

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Abstract

Polysilanes are a class of polymeric semiconductors with potential to emit in the ultraviolet (UV) region and, full colour display can be realized by down-converting the UV emission from polysilanes to RGB (red, green, blue). However, the efficiency of the organic light emitting diodes (OLEDs) made from polysilanes is low.^{1,2} In order to make useful OLEDs, the external quantum efficiencies would have to be improved by an order of magnitude to replace the existing technologies. The photoluminescence quantum efficiency (PLQE) is one of the several factors that determine the efficiency in OLED. The photoluminescence (PL) efficiencies of these materials are known to be high in the solution form. However, the PLQE in film form is much more important from device point of view. We have determined the external PLQE of several polysilanes film in order to see the usefulness of these materials in LEDs. Two different methods for determining the PLQE have been employed. The effect of side groups attached to the polysilane main chain on PLQE is discussed. We also report the PLQE of these materials as a function of excitation wavelength.