Highly polarized emission by vacuum evaporation of organic light-emitting compound

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The ordering of organic semiconducting compounds has been of interest in scientific researches as well as technical applications since it affected the performance of many optoelectronic applications such as light-emitting diodes and field effect transistor [1-3]. Especially, the ordering of the organic light-emitting compounds is directly correlated to their dipole orientation and thus such compounds emit the polarized light [3,4]. Such organic compounds emitting the highly polarized light are almost conjugated polymers on anisotropically treated substrates. However, the demonstration of highly polarized emission based on an evaporation of low molecules has not been reported yet.

In this work, we first demonstrated linearly polarized photoluminescence (LPPL) by an evaporation of low molecules. The low molecular light-emitting compound exhibits liquid crystalline (LC) phase and thus a highly ordered state is easily achieved on the anisotropically treated substrate. After the evaporation of the mesogenic light-emitting compound on the rubbed alignment layer the thermal annealing process at the LC phase is carried out and the rapidly quenching process is followed. By thermal annealing and rapidly quenching processes, a ratio of the parallel LPPL to the perpendicular LPPL to the rubbing direction is dramatically improved from 1.5:1 to 8.2:1.

Fig. 1 LPPL spectra of the evaporated light-emitting compound (a) without and (b) with the thermal annealing and rapid quenching processes

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References