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Photo- and Electroluminescence for TCNQ-amino Adducts

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Photo- and Electroluminescence for TCNQ-amino Adducts

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Photoluminescence of TCNQ-amino adducts was studied to evaluate solid state samples of photoluminescence quantum yields. High PL quantum yields suggests that TCNQ-amino adducts should be an excellent organic light emitter. Electroluminescence of TCNQ-amino adducts was demonstrated for the first time.

Keywords: TCNQ adducts; photoluminescence; electroluminescence; organic light emitter

INTRODUCTION

The chemistry of tetracyanoquinodimethane (TCNQ) was established in 1962 [1]. TCNQ can be substituted by amines to give TCNQ-amino adducts that were investigated for nonlinear optical properties because of their large hyperpolarisability (β) and highly polar in nature [2]. It was recently reported that strong fluorescence was observed from certain of our TCNQ-amino adducts [3,4]. Interest in organic light emitting chromophores has expanded rapidly since the discovery of efficient electroluminescence, and its use in light emitting devices [5,6]. Our TCNQ adducts can be a new candidate for the use in light emitting devices. The TCNQ adducts investigated here are shown in figure 1.

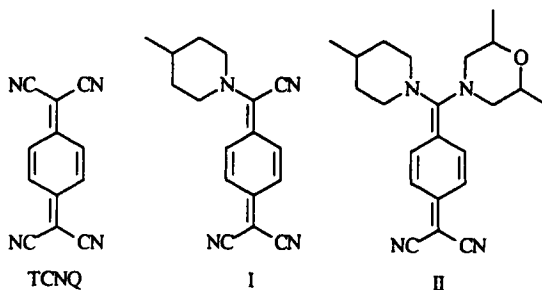


FIGURE 1 Chemical structures of TCNQ-amino adducts

EXPERIMENTAL

Synthesis of 7-(4-methylpiperidino)-7,8,8-tricyanoquinodimethane

(compound I), and 7-(2,6-dimethylmorpholino)-7-(4-methylpiperidino)-8,8-dicyanoquinodimethane (compound II), and the preparation of the solid states samples for the photoluminescence study were described [3,4]. The preparation of polymeric thin film samples for the electroluminescence study will be presented elsewhere.

RESULTS AND DISCUSSION

The photoluminescence quantum yield of the compound II doped into a PMMA matrix was measured up to 0.38 ± 0.03 . That of the crystalline sample of II was also measured to 0.23 ± 0.03 [3,4]. Therefore, the use of the compound II for electroluminescence is worth pursuing.

Electroluminescence was observed from a spin coated PVK film where compound II, α -NPD, and t-butyl PBD were added for light emitting, hole transporting, and electron transporting, respectively. The emission spectrum of photoluminescence is almost consistent with that of electroluminescence, as shown in figure 2. Both emission maxima of electroluminescence and photoluminescence were about 530 nm. This is the first observation of electroluminescence from TCNQ-amino adducts.

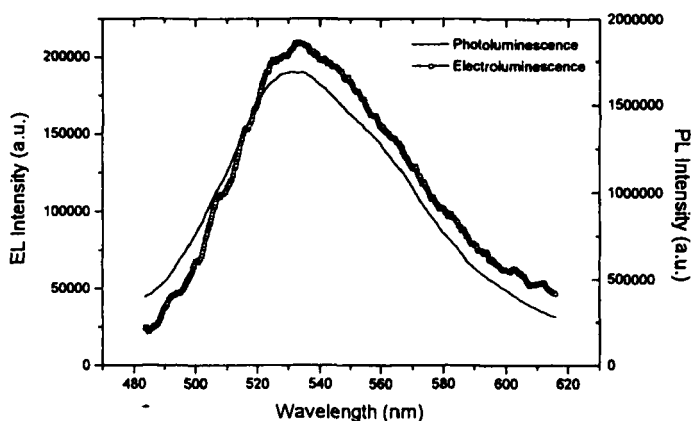


FIGURE 2 Photo- and electroluminescence of the compound II

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