FACILE PREPARATION OF TRIPHENYLAMINE-BASED ELECTROCHROMIC POLYMERS VIA ARYLAMINE ELECTRO-COUPLING REACTION

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Arylamine-based derivatives have attracted significant attention in the past years due to their unique properties that allow them to have potential applications in organic electronics.[1] Many star-shaped, dendrimeric and polymeric triarylamines have been synthesized as photoconductors and hole-transporting materials for various electro-optical applications.[2] In the last decade, a huge amount of high-performance polymers (typically, aromatic polyamides and polyimides) carrying the TPA and/or carbazole unit have been prepared and evaluated for electrochromic applications.[3] In recent years, redox-active polyamide and polyimides containing triarylamine units also could be eaily preapared via electrochemical oxidative coupling reactions between arylamino groups.[4] In this work, bis{*N*-[4-(4-diphenylaminobenzamido)phenyl]-*N'*-(4-methoxyphenyl)}-1,4-phenylenediamine [**(MeO)$_2$TPPA-(TPA)$_2$**] and bis{*N*-[4-(4-carbazol-9-ylbenzamido)phenyl]-*N'*-(4-methoxyphenyl)}-1,4-phenylenediamine [**(MeO)$_2$TPPA-(NPC)$_2$**] were synthesized as electropolymerizable monomers from condensation reactions of *N,N'*-di(4-aminophenyl)-*N,N'*-di(4-methoxyphenyl)-1,4-phenylenediamine [**(MeO)$_2$TPPA-(NH$_2$)$_2$**] with 4-carboxytriphenylamine (**TPA-COOH**) and *N*-(4-carboxyphenyl)carbazole (**NPC-COOH**), respectively. The electrochemical polymerization over indium tin oxide (ITO) electrode of these two **(MeO)$_2$TPPA**-cored monomers allows the generation of electroactive polymeric films. The electro-generated polymer films exhibited reversible redox processes and multi-colored electrochromic behaviors upon electro-oxidation. The electrochromic films possess preferable coloration efficiency and cycling stability.

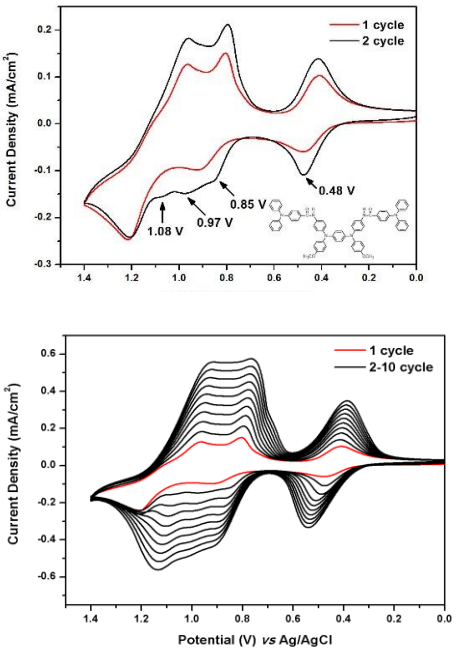

Fig. 1. CV diagrams of **(MeO)$_2$TPPA-(TPA)$_2$** in 0.1 M Bu_4NClO_4/CH_2Cl_2 with a scan rate of 50 mV/s.

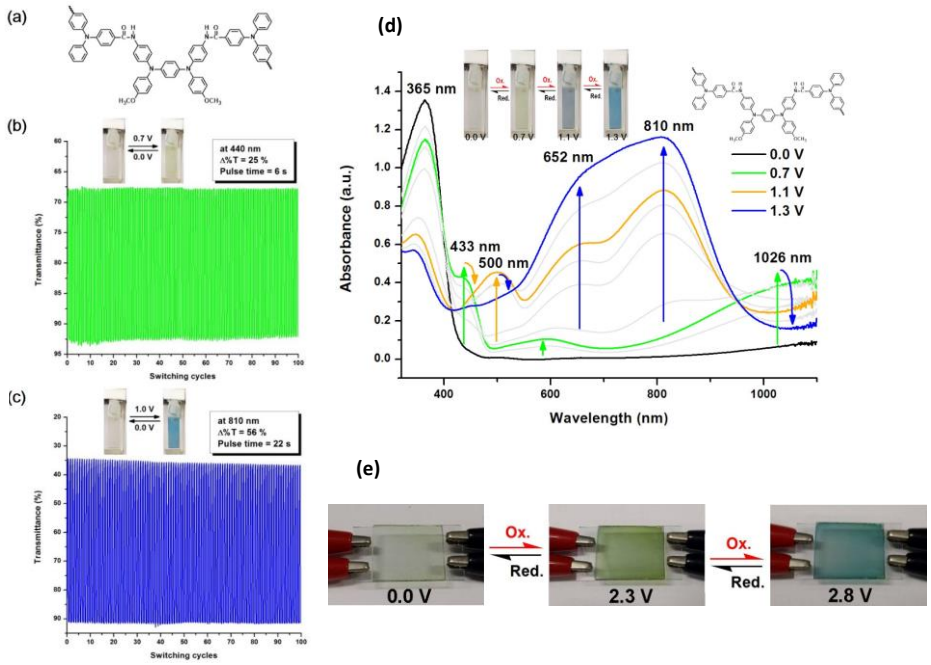

Fig. 2. Structure, switching stability, spectroelectrochemistry, and electrochromic device of the electro-generated film of **(MeO)$_2$TPPA-(TPA)$_2$**.

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