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Conjugated oligomers with thiophene and indole moieties: Synthesis, photoluminescence and electrochromic performances

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Abstract

Two series of thiophene oligomers and terthiophene oligomers consisting of both thiophene and indole moieties have been synthesized. They have same excitation-dependent photoluminescence characteristics, but different bandgaps and absorption behaviors, which relates to the number and denseness of indoles in the conjugated oligomers and the length of alkyl chains on indole moiety due to varied the π - π stacking interaction of conjugated structures in the as-prepared oligomers. A simple electrochromic device based on such a conjugated oligomer displays a novel four-color electrochromism from red to yellow, green and puce with the increased potential and possesses good environmental and redox stability. Such conjugated oligomer also exhibits high sensitivity and selectivity for Zn^{2+} detection.

Introduction

Conjugated polymers have attracted lots of scientific and technological research interest during the past few decades because of their unique features such as fast switching time,¹ high optical contrasts,² processability,³⁻⁶ and easy tuning of color with alternations in the structure.⁷ Among them, polythiophene and its derivatives

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