

ห้องสมุดงานวิจัย สำนักงานคณะกรรมการวิจัยแห่งชาติ



E41060

**EFFECTS OF STRUCTURAL MODIFICATION ON PHOTOPHYSICAL
PROPERTIES OF POLYDIACETYLENE ASSEMBLIES
IN DIFFERENT ENVIRONMENTS**

CHANITA KHANANTONG

**A Thesis Submitted to the Graduate School of Naresuan University
in Partial Fulfillment of the Requirements
for the Master of Science Degree
in Chemistry
October 2011
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This thesis entitled "Effects of structural modification on photophysical properties of polydiacetylene assemblies in different environments" submitted by Chanita Khanantong in partial fulfillment of the requirements for the Master of Science Degree in Chemistry is hereby approved.

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ABSTRACT

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In this study, we investigate the effects of structural modification on thermochromic and fluorescent properties as well as morphologies of polydiacetylene(PDA) assemblies in aqueous solutions and other solvents. In addition, we explore the reversible and irreversible thermochromism of PDA assemblies in various thin films. We have found that the variation of linkers affects both color transition temperature and the thermochromic reversibility. The PDA assemblies in drop cast film exhibits higher color transition temperature than that of the solution. The increase of temperature to 200 °C causing irreversible color transition, break the hydrogen bonding between the head group. The change from water to alcohol and alkane media results in PDA assemblies with higher molecular ordering. The poly(EBPCDA-2DA) assemblies in powder form prepared from all solvents exhibits the T_m at ~124 °C, which is close to the 2nd color transition temperature. The photopolymerization behaviors of DA assemblies vary with the solvents. In addition, the conjugation length of PDA assemblies changes with polymerization time and type of solvent. The PDA assemblies in different solvents can be embedded in different polymers including polyvinylalcohol, polymethylmethacrylate and polystyrene. The poly(PCDA), poly(APOEO-2DA) and poly(p-PA-2DA) assemblies in the red form exhibit fluorescent properties. The spectra exhibit different shape, which is probably due to the difference of molecular packing within the assemblies.

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ABBREVIATIONS

EBPCDA-2DA	=	N,N'-ethylenebispentacos-10,12-diyamide
BDPCDA-2DA	=	N,N'-(butane-1,4-diyl)dipentacos-10,12-diyamide
PDPCDA-2DA	=	N,N'-(pentane-1,5-diyl)dipentacos-10,12-diyamide
HDPCDA-2DA	=	N,N'-(hexane-1,6-diyl)dipentacos-10,12-diyamide
APOEO-2DA	=	N,N'-(3,3'-(2,2'-oxybis(ethane-2,1-diyl)bis(oxy)) bis(propane-3,1-diyl))dipentacos-10,12-diyamide
<i>p</i> -PA-2DA	=	N,N'-(1,4-phenylene)dipentacos-10,12-diyamide
<i>m</i> -PA-2DA	=	N,N'-(1,3-phenylene)dipentacos-10,12-diyamide
<i>c</i> -CA-2DA	=	N,N'-(1,2-phenylene)dipentacos-10,12-diyamide
PCDA	=	10,12-pentacosadiynoic acid
PDA	=	polydiacetylene
DA	=	diacetylene
T _m	=	melting temperatures
T _c	=	crystallization temperatures
%CR	=	colorimetric response