

# Polydiacetylene-Based Nanocomposite as Colorimetric Sensors

Nisanart Traiphol\*

Laboratory of Chromic Materials, Department of Materials Science, Faculty of Science, Chulalongkorn University,  
Bangkok 10330

Phone +66 2218 5541, Fax +66 2218 5561, \*E-Mail: Nisanart.t@chula.ac.th

## Abstract

Polydiacetylene (PDA) assemblies exhibit color transition upon exposure to various external stimuli, rendering them to be utilized in many sensing technologies. Our group recently introduces a new class of materials by incorporating zinc oxide (ZnO) nanoparticles into the PDA assemblies. New evidences show that  $Zn^{2+}$  ions are incorporated into PDA layers. Strong interfacial interaction between PDA and ZnO nanoparticles results in reversible thermochromism in aqueous suspension and various organic solvents. The color reversibility persists up to 200 °C when the PDA/ZnO nanocomposites are fabricated into thin films by embedding in various polymeric matrices. In addition, the PDA/ZnO nanocomposites exhibit dual colorimetric response to acids and bases, allowing their utilization as chemical sensors. The nanocomposite can be used to detect and differentiate organic acids and bases in various media and at relatively wide concentration range. Their color-transition temperature and colorimetric response to acids and bases can be finely tuned by varying photopolymerization time and structure of the constituent PDAs. The nanocomposites prepared by using a combination of  $Zn^{2+}$  ions and other types of nanoparticles,  $TiO_2$ ,  $SiO_2$  and  $Al_2O_3$ , are also investigated.

**Keywords:** polydiacetylene; color transition; colorimetric sensor