

# Utilizing the nitroaniline compounds to improve the holographic data storage characteristics of 9,10-phenanthrenequinone (PQ) doped poly( methyl methacrylate) (PMMA) photopolymer

Cheng-Jung Ko<sup>a</sup>, Yi-Nan Hsiao<sup>b\*</sup>, Wha-Tzong Whang<sup>a\*</sup>

<sup>a</sup> Department of Material Science and Engineering, National Chiao Tung University, Hsin-Chu 30010, ROC

<sup>b</sup> Institute of Electro-Optical Engineering, National Chiao Tung University, Hsin-Chu 30010, ROC

## Abstract

A novel approach to improve the characteristics of holographic data storage photopolymer has been developed in this research. Through codoping different kinds of nitroaniline compounds such as N,N-dimethyl-4-nitroaniline (DMNA), N-methyl-4-nitroaniline (MNA) and 4-nitroaniline (pNA), into 9,10-phenanthrenequinone (PQ) doped poly( methyl methacrylate) (PMMA), the stability of diffraction efficiency and the value of dynamic range (M#) have been progressed. From the sample with codoped PQ and DMNA, the maximum diffraction efficiency has been increased from 38% to 56% without further downgrade and M# has increased from 3.8 to 8.4. The recording mechanism also has been analysed by UV-Vis spectra, Photoluminescence (PL), Fourier Transform Infrared spectra (FTIR), <sup>1</sup>H-NMR spectra. The results indicate that the holographic data storage characteristics of PQ/PMMA photopolymer can be improved through codoping nitroaniline compounds.

*Keyword:* holographic, data storage, photopolymer, nitroaniline