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NONLINEAR OPTICAL AND OPTICAL LIMITING PROPERTIES OF CHICAGO SKY BLUE 6B DOPED PVA FILM AT 633 NM AND 532 NM STUDIED USING A CONTINUOUS WAVE LASER

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We present our results on nonlinear optical (NLO) of chicago sky blue 6B doped polyvinyl alcohol (PVA) film. This film was studied at 633 nm and 532 nm using a continuous wave laser. We have evaluated the sign and magnitude of the third-order nonlinearity from the closed aperture Z-scan data while the nonlinear absorption properties were assessed using the open aperture data. The chicago sky blue 6B doped PVA film exhibited nonlinear saturated absorption and strong self-defocusing effect. The limiting effect of the sample was studied and the results indicate that the film possesses good characteristic of optical limiting.

Keywords: Nonlinear optics; nonlinear refractive index; Z-scan technique; optical limiting; dye.

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1. Introduction

During the past two decades, much effort has been made in the synthesis of novel compounds and composite materials for their potential applications in nonlinear optics.[1–3] Materials such as semiconductors, polymers, liquid crystal, metallic nanocluster materials and organic compounds had been successfully introduced as dopants into various solid hosts for nonlinear optical applications.[4–10] Organic dye-doped-solids such as dye-doped boric acid, PMMA and gelatin are among the most extensively studied.[11–16] These dye-doped materials form an important class of attractive candidates for use in low power optical devices such as optical power limiter, low power optical phase conjugated mirror and optical logic gate. Such applications hold good promises due to the low power optical nonlinearity of the dye in rigid environment.

Azo dye containing polymer films has good photo-thermal stability, dissolvability and easy preparation virtue, so it can be used as a kind of novel storage medium. Most importantly, its structure can be modified to change its absorption band according to needs. Its potential application is to work as novel optical limiter for