

# SYNTHESIS, LINEAR AND NONLINEAR OPTICAL PROPERTIES OF AG/PVP NANOCOMPOSITE

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## ABSTRACT

In this study, silver nanoparticles were synthesized using sodium borohydride (NaBH<sub>4</sub>) as a reducing agent at different concentrations (1 wt %, 2 wt %, 5 wt %) of poly N-vinylpyrrolidone (PVP) as a stabilizing agent by chemical reduction method. The reaction was carried at room temperature. Resulting nano-sized colloids have been characterized by FT-IR spectroscopy, UV-Visible spectroscopy, X-ray diffraction, and Transmission Electron Microscopy (TEM). Very strong surface Plasmon resonance peak at 410 nm in the UV-Visible is a direct evidence of formation of nano-sized silver colloids. XRD Diffraction pattern reveals the formation of cubic structured crystals. Transmission Electron Microscopy (TEM) confirms average diameter of silver nanoparticles as 9 nm. The non-linear refractive index ( $n_2$ ) were calculated by Z-Scan technique using CW He-Ne laser ( $\lambda=632$  nm) and are obtained as high as  $3.353 \times 10^{-4} \text{ cm}^2/\text{W}$ ,  $8.697 \times 10^{-4} \text{ cm}^2/\text{W}$ , and  $9.469 \times 10^{-4} \text{ cm}^2/\text{W}$  for 1 wt%, 2 wt% and 5 wt% of PVP respectively.

**KEYWORDS:** Silver Nanocomposite, Nonlinear Refractive Index, UV-Visible, FTIR, XRD, TEM, Z-Scan Technique