

PHYSICOCHEMICAL AND NONLINEAR-OPTICAL
PROPERTIES OF V₂O₅ QUANTUM DOTS
AND QUANTUM RODS IN PVA

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S u m m a r y

V₂O₅/polyvinyl alcohol (PVA) nanocomposite and its thin films [(1 – 10) μm] were synthesized and studied by means of electron (UV, visible, near IR spectral range) and EPR spectroscopies. The presence of quantum dots and quantum tapes of V₂O₅ in the composite has been approved by means of X-ray diffraction and Atomic Forced Microscope (AFM) studies. The nonlinear refraction of the samples has been studied in the schemes of degenerate four-wave mixing and Z-scan. The sign and value of the nonlinear refractive index coefficient n₂ have been determined. Possible mechanisms of the nonlinear refraction are discussed. It has been shown that the composite polymer material containing nanoparticles of V₂O₅ and the low glass transition temperature polymer matrix exhibit a high third-order optical nonlinearity [$\chi^{(3)}(\omega;\omega,-\omega,\omega) = 2.4 \cdot 10^{-15} \text{ m}^2/\text{V}^2$] and can be used as a medium for the holographic recording by a single laser pulse with the 10-ns duration.