

Nonlinear Optical Properties of Metal Nanoparticles in Silicate Glass

A.L. Stepanov

Russian Academy of Sciences, Kazan, Russian Federation

Kazan Federal University, Kazan, Russian Federation

Kazan National Research Technological University, Kazan, Russian Federation

OUTLINE

7.1 Introduction	165	7.4 Applications	177
7.2 Nonlinear Absorption and Optical Limiting of Copper Nanoparticles	166	7.5 Summary	177
7.3 Nonlinear Refraction of Cu and Ag Nanoparticles	171	Acknowledgments	177
		References	177

7.1 INTRODUCTION

The aim of this review is the analysis of the advantages in optical science and technology, such as the development of nonlinear optical random metal-dielectric composites based on metal nanoparticles (MNPs) synthesized by the ion implantation. Simultaneously with the development of novel technologies [1–6] intended for nanoparticle synthesis, substantial practical attention has been devoted to design the techniques for controlling the MNP size. The giant enhancement of nonlinear optical response of the random media with MNPs is often associated with optical excitation of surface plasmon resonances (SPRs) that are the collective electron oscillation modes, which strongly depend on the structure of the MNPs [4]. This is caused by the fact that the optical properties of MNPs, which are required for various applications, play a role up to a certain sizes of MNPs. In this content, ion implantation