

CONTENTS

Introduction	4
Nanostructures and nanoparticles – synthesis and biological application	5
Quantum dots	7
Classification of quantum dots	9
The composition of quantum dots (semiconductor material)	9
The form of quantum dots	11
Multi-material quantum dots	11
Doped quantum dots	11
Quantum dots based on solid solutions	11
Heterojunction based quantum dots	13
Quantum dots synthesis methods	13
The synthesis of colloidal QDs in nonpolar media	13
Nucleation stage in a supersaturated solution	14
The stage of embryo growth	16
Oswald Maturation	17
Stabilization of the particles	18
The main types of stabilizers	18
Quantum dots synthesis by terminated gas condensation method	19
Application of colloidal quantum dots	21
Materials for lasers	22
Materials for LEDs	23
Use as biomarkers	24
The use of nanotechnology and its impact on humans and the environment	25
Nanoparticles uptake by living organisms	45
Nanoparticles characterization methods in biological objects	46
Scanning electron microscopy (sem)	46
Transmission electron microscopy (tem)	47
Dynamic light scattering (dls)	47

Raman spectroscopy	48
Atomic force microscopy (afm)	49
X-ray diffraction (xrd)	51
Confocal laser scanning microscopy (clsm)	55
Indirect methods of determining nanoparticles effect on biological objects	56
Detection of autofluorescence and photobleaching	56
Spectrofotometry.....	60
Flow-cytometry and DNS ploidy analysis.....	60
References	61