LIST OF FIGURES

Figure No.	Figure Caption	Page
		No.
Fig. 1.1	Reaching at the nanoworld	1
Fig. 1.2	Perceived stages of nanotechnology development based on increasing technological complexity	2
Fig. 1.3	Diagram indicating relative scale of nano-sized objects	4
Fig. 1.4	Size comparison of nanoparticles with bacteria, viruses and molecules	5
Fig. 1.5	Nanoparticle synthesis	6
Fig. 2.1	Hydrolysis reaction of Titanium Ethoxide	13
Fig. 2.2	Pictorial representation of microemulsion and reverse micelles	16
Fig. 3.1	Schematic diagram showing the preparation of TiO ₂ particles in microemulsions	45
Fig. 3.2	Procedure for preparation of TiO ₂ powder	47
Fig. 4.1	XRD pattern of TiO_2 sample calcined at 680 °C containing 100 % rutile	57
Fig. 4.2	DT-TGA of precipitate samples from microemulsion synthesis of Titania	58
Fig. 4.3	XRD pattern of TiO ₂ sample calcined at 580 °C containing 66.8% anatase and 33.2 % rutile	59
Fig. 4.4(a)	SEM image of as prepared sample Dispersed in acetone	60
Fig. 4.4(b)	SEM image of as prepared sample Dispersed in propanol	60
Fig. 4.5(a)	SEM image of samples with 0.5 M TiCl ₄ and 1.5 M NH ₄ OH	60
Fig. 4.5(b)	SEM image of samples with 0.5 M TiCl ₄ and 1.0 M NH_4OH	60
Fig. 4.6	FT-Raman spectra of sample-1	63
Fig. 4.7	FT-Raman spectra of sample-2	64
Fig. 4.8	FT-Raman spectra of sample-3	64
Fig. 4.9	FT-Raman spectra of sample-3	65

 g. 4.10 FT-Raman spectra of sample-4 g. 4.11 FT-IR spectra of different samples with organic solvents (1-5) g. 4.12 XRD pattern of sample 1 to 5 g. 4.13 SEM pictures of titania particles synthesized bys sol-gel technique in different solvents g. 4.14 SEM images for effect of calcining temperature g. 4.15 Pictorial representation of microemulsion and reverse micelles g. 4.16 XRD patterns of the as prepared CdSe particles for base case 	 65 66 67 68 68 69 71
 g. 4.11 FT-IR spectra of different samples with organic solvents (1-5) g. 4.12 XRD pattern of sample 1 to 5 g. 4.13 SEM pictures of titania particles synthesized bys sol-gel technique in different solvents g. 4.14 SEM images for effect of calcining temperature g. 4.15 Pictorial representation of microemulsion and reverse micelles g. 4.16 XRD patterns of the as prepared CdSe particles for base case 	 66 67 68 68 69 71
 g. 4.12 XRD pattern of sample 1to 5 g. 4.13 SEM pictures of titania particles synthesized bys sol-gel technique in different solvents g. 4.14 SEM images for effect of calcining temperature g. 4.15 Pictorial representation of microemulsion and reverse micelles g. 4.16 XRD patterns of the as prepared CdSe particles for base case 	67 68 68 69 71
 g. 4.13 SEM pictures of titania particles synthesized bys sol-gel technique in different solvents g. 4.14 SEM images for effect of calcining temperature g. 4.15 Pictorial representation of microemulsion and reverse micelles g. 4.16 XRD patterns of the as prepared CdSe particles for base case 	68 68 69 71
 g. 4.14 SEM images for effect of calcining temperature g. 4.15 Pictorial representation of microemulsion and reverse micelles g. 4.16 XRD patterns of the as prepared CdSe particles for base case 	68 69 71
 g. 4.15 Pictorial representation of microemulsion and reverse micelles g. 4.16 XRD patterns of the as prepared CdSe particles for base case 	69 71
g. 4.16 XRD patterns of the as prepared CdSe particles for base case	71
g. 4.17 XRD patterns of the as prepared CdSe particles for excess Cd	71
g. 4.18 XRD patterns of the as prepared CdSe particles for excess Se	72
g. 4.19 SEM image of Base case at 20000X for Reverse micelle method	74
g. 4.20 SEM image of Base case at 50000X for Reverse micelle method	74
g. 4.21 SEM image of Excess Cd (50000X)	74
g. 4.22 SEM image of Excess Se (50000X)	74
g. 4.23 XRD pattern of as-prepared CdSe particles for B1 case	76
g. 4.24 XRD pattern of as-prepared CdSe particles for B4 case	77
g. 4.25 SEM image of RB1 case at 20000X for Hydrothermal method	79
g. 4.26 SEM image of RB1 case at 50000X for Hydrothermal method	79
g. 4.27 SEM image of RB1 case at 70000X for Hydrothermal method	79
g. 4.28 Excitation Spectra for Reverse micelle method	80
g. 4.29 Emission Spectra for Reverse micelle method	81
g. 4.30 Excitation Spectra for Hydrothermal method	0.1
g. 4.31 Emission Spectra for Hydrothermal method	81

Figure No.	Figure Caption	Page No.
Fig. 5.1	Illustration of Inner liner in tires	84
Fig. 5.2	Structure of sodium montmorillonite	86
Fig. 5.3	Illustration of different states of dispersion of organoclays in polymers with corresponding WAXS and TEM results	88
Fig. 5.4	Particle size distribution of Fillers	92
Fig. 5.5	Experimental flow chart	93
Fig. 5.6	Hardness v/s Filler loading	96
Fig. 5.7	Tensile strength v/s Filler loading	97
Fig. 5.8	Tear strength v/s Filler loading	97
Fig. 5.9	Elongation break v/s Filler Loading	97
Fig. 5.10	Typical profile of cure curve	99
Fig. 5.11	ML v/s Filler Loading	99
Fig. 5.12	MH v/s Filler Loading	99
Fig. 5.13	TS2 v/s Filler Loading	99
Fig. 5.14	(Tc10,Tc50,Tc 90) v/s Filler Loading	100
Fig. 5.15	MV v/s Filler Loading	100
Fig. 5.16	Loss modulus v/s Filler Loading	102
Fig. 5.17	Storage modulus v/s Filler Loading	102
Fig. 5.18	Tand v/s Filler loading	103
Fig. 5.19	Loss compliance v/s Filler loading	104
Fig. 5.20	XRD of all samples	105
Fig. 5.21	WAXD pattern of nanocomposite M5 (8 phr nanoclay)	105
Fig. 5.22	TFM pictures of Sample M1	106
Fig. 5.23	TFM pictures of Sample M2	106
Fig. 5.24	TFM pictures of Sample M3	106
Fig. 5.25	TFM pictures of Sample M4	107

Figure No.	Figure Caption	Page
		No.
Fig. 5.26	TFM pictures of Sample M5	108
Fig. 5.27	AFM pictures of Sample M0	110
Fig. 5.28	AFM pictures of Sample M1	110
Fig. 5.29	AFM pictures of Sample M2	111
Fig. 5.30	AFM pictures of Sample M3	111
Fig. 5.31	AFM pictures of Sample M4	112
Fig. 5.32	AFM pictures of Sample M5	112