

## LIST OF SCHEMES AND FIGURES

Figure No.	Title	Page No.
1.1	Nanoparticulate based drug delivery system	2
1.2	Lycurgus cup at the British museum	3
1.3	Transmission electron micrographs of gold (a) nanospheres (b) nanorods and silver (c) nanoprisms (mostly truncated triangles) formed using citrate reduction, seeded growth, and DAAF reduction, respectively. Photographs of colloidal dispersions of gold/silver alloy nanoparticles with increasing gold concentration (d), gold <i>nanorods</i> of increasing aspect ratio (e), and silver nanoprisms with increasing lateral size (f)	8
S1.1	Photochemical synthesis of mixed monolayer (BSA/PEG) stabilized gold nanoparticles	10
S1.2	Various applications of gold nanoparticles in therapy	17
1.4	TEM images of plasmonic gold nanostructures commonly used for photo thermal therapy, a) nanosphere, b) nanorods, c) nanoshell	18
5A.1	Synthesis of gold nanoparticles using gellan gum as reducing agent	57
5A.2	(a) UV/Vis absorption spectra of gellan gum (0.02% w/v) reduced gold nanoparticles. (b) UV/Vis absorption spectra of gellan gum reduced gold nanoparticles measured upto 7 days	58
5A.3	UV/Vis absorption spectra of gold nanoparticles synthesized using different concentrations of gellan gum	59
5A.4	(a) UV/Vis absorption spectra of gellan gum (0.02% w/v) reduced gold nanoparticles using gold ion concentration of $10^{-3}$ M. (b) UV/Vis absorption spectra of gellan gum reduced gold nanoparticles synthesized at various pH (data shown after 24h of synthesis)	60
5A.5	TEAA images of (a) 0.01% w/v, (b) 0.02% w/v, (c) 0.06% w/v and (d) 0.17c w/v and particle size distribution (e) 0.02% w/v, (f) 0.1% w/v of gold nanoparticles reduced using different concentrations of gellan gum	62
5A.6	XRD) patterns of the gold nanoparticles reduced by 0.02% w/v dispersion of gellan gum	64
5A.7	UV/Vis absorption spectra of gellan gum (0.02%> w/v) reduced gold nanoparticles (a, c) pH study and (b) electrolyte study	65
5A.8	Stability study of gold nanoparticles synthesized using different concentrations of gellan gum, t = 3 months, (a) 2-8 °C (refrigerated) and (b) 25 °C/65% RH (room temperature)	66

Figure No.	Title	Page No.
5A.9	(a) Spray dried powder (reduced by 0.02% w/v gellan gum) and redispersed gold nanoparticles. (b) UV/Vis absorption spectra of redispersed spray dried gold nanoparticles	67
5A.10	(a) TEM image of redispersed spray dried gold nanoparticles (reduced by 0.02% w/v gellan gum) and (b) particle size distribution of the same	68
5A.11	Stability study of redispersed spray dried gold nanoparticles (reduced by 0.02% w/v gellan gum, upto three months (a) 2-8 °C (refrigerated) and (b) 25 °C/65% RH (room temperature)	69
5B.1	Confocal images of (a) blank gold nanoparticles, (b) Texas red treated human glioma cell lines LN-229	76
5B.2	Confocal images of cellular uptake of gellan gum gold nanoparticles in human glioma cell lines LN-229. (a) Phase (b) DAPI (c) gold nanoparticles and (d) overlaid	78
5B.3	Light photomicrograph of heart after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	89
5B.4	Light photomicrograph of kidney after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	89
5B.5	Light photomicrograph of liver after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	90
5B.6	Light photomicrograph of lung after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	90
5B.7	Light photomicrograph of pancreas after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	91
5B.8	Light photomicrograph of spleen after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	91
5B.9	Light photomicrograph of stomach after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	92
5B.10	Light photomicrograph of intestine after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	93

Figure No.	Title	Page No.
5B.11	Light photomicrograph of brain after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	93
5B.12	Light photomicrograph of urinary bladder after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	94
5B.13	Light photomicrograph of testis after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	95
5B.14	Light photomicrograph of uterus after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	95
5B.15	Light photomicrograph of ovary after 28 days of administration of gellan gum reduced gold nanoparticles by oral route at a dose of (a) control, (b) 75 ppm, (c) 150 ppm and (d) 300 ppm	96
6A.1	FTIR spectra of (a) doxorubicin solution and (b) doxorubicin loaded gold nanoparticles	109
6A.2	UV/Vis absorption spectra of pH study of doxorubicin loaded gold nanoparticles	110
6A.3	(a) TEAA image of doxorubicin loaded gold nanoparticles (reduced by 0.02% w/v gellan gum) and (b) particle size distribution of the same	110
6A.4	(a) TEM image of spray dried doxorubicin loaded gold nanoparticles and (b) particle size distribution of the same	111
6A.5	Fluorescence spectra of (a) doxorubicin solution and (b) doxorubicin loaded gold nanoparticles	112
6A.6	Fluorescence spectra of spray dried doxorubicin loaded gold nanoparticles, stability period of three months, (a) 2-8°C (refrigerated) and (b) 25°C/765% RH (room temperature)	113
6A.7	Viability of LN-18 after (a) 24 and (b) 48 h, after exposure to (from left to right): control (media), blank gold nanoparticles, doxorubicin solution and doxorubicin loaded gold nanoparticles	114
6A.8	Viability of LN-229 after (a) 24 and (b) 48 h, after exposure to (from left to right): control (media), blank gold nanoparticles, doxorubicin solution and doxorubicin loaded gold nanoparticles	115

Figure No.	Title	Page No.
6A.9	Confocal microscopy images to demonstrate the apoptosis induced by doxorubicin loaded gold nanoparticles on human glioma cell line LN-18 (a) Phase (b) DAPI (c) doxorubicin loaded gold nanoparticles and (d) overlaid (b&c)	117
6A.10	Confocal microscopy images to demonstrate the apoptosis induced by doxorubicin loaded gold nanoparticles on human glioma cell line LN-229 (a) Phase (b) DAPI (c) doxorubicin loaded gold nanoparticles and (d) overlaid (b&c)	118
S6B.1	(a) Schematic diagram showing synthesis of sophorolipid and sophorolipid conjugated gold nanoparticles and (b) UV/Vis absorption spectra of sophorolipid and Poly(ethylene glycol) conjugated gold nanoparticles	127
6B.1	UV/Vis absorption spectra of sophorolipid conjugated gold nanoparticles (a, c) pH study and (b) electrolyte study	128
6B.2	UV/Vis absorption spectra of poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles (a, c) pH study and (b) electrolyte study	129
6B.3	(a) TEM image of sophorolipid conjugated gold nanoparticles and (b) particle size distribution of the same	130
6B.4	(a) TEM image of poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles and (b) particle size distribution of the same	131
6B.5	(a) Spray dried powder of sophorolipid and redispersed gold nanoparticles. (b) UV/Vis absorption spectra of spray dried sophorolipid conjugated gold nanoparticles	132
6B.6	(a) Spray dried powder of poly(ethylene glycol)-sophorolipid and redispersed gold nanoparticles. (b) UV/Vis absorption spectra of spray dried poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles	132
6B.7	TEM images of spray dried (a) sophorolipid and (b) poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles	133
6B.8	Stability study of spray dried, t=6 months (a) sophorolipid and (b) poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles	133
6B.9	Confocal images of cellular uptake of sophorolipid conjugated gold nanoparticles in human glioma cell lines LN-229. (a) Phase (b) DAPI (c) gold nanoparticles and (d) overlaid (b&c)	135
6B.10	Confocal images of cellular uptake of poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles in human glioma cell lines LN-229. (a) Phase (b) DAPI (c) gold nanoparticles and (d) overlaid (b&c)	135

Figure No.	Title	Page No.
6B.11	TEM images of doxorubicin loaded (a) sophorolipid and (b) poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles	136
6B.12	Fluorescence spectra of doxorubicin (A) Sophorolipid (B) poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles. (a) doxorubicin solution and (b) doxorubicin loaded gold nanoparticles	137
6B.13	Stability study of spray dried doxorubicin loaded, t=3 months (a) sophorolipid and (b) poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles	138
6B.14	Viability of LN-229 after (a) 24 and (b) 48 h, after exposure to (from left to right): control (media), sophorolipid gold nanoparticles, doxorubicin solution and doxorubicin loaded sophorolipid gold nanoparticles	139
6B.15	Viability of HNGC-2 after (a) 24 and (b) 48 h, after exposure to (from left to right): control (media), sophorolipid gold nanoparticles, doxorubicin solution and doxorubicin loaded sophorolipid gold nanoparticles	141
6B.16	Viability of (a) LN-229 and (b) HN6C-2, after 48 h exposure to (from left to right): control (media), poly(ethylene glycol)-sophorolipid gold nanoparticles, doxorubicin solution and doxorubicin loaded poly(ethylene glycol)-sophorolipid gold nanoparticles	142
6B.17	Phase contrast images to demonstrate the morphology changes on (A) human glioma cell line LN-229 (B) human glioma stem cell line HNSC-2 due to (a) media (b) sophorolipid nanoparticles (c) free doxorubicin solution (d) doxorubicin loaded sophorolipid conjugated gold nanoparticles	144
6B.18	Phase contrast images to demonstrate the morphology changes on (A) human glioma cell line LN-229 (B) human glioma stem cell line HNGC-2 due to (a) media (b) poly(ethylene glycol)-sophorolipid nanoparticles (c) free doxorubicin solution (d) doxorubicin loaded poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles	144
6B.19	Confocal microscopy images to demonstrate the apoptosis induced by doxorubicin loaded sophorolipid conjugated gold nanoparticles on (A) human glioma cell line LN-229 (B) human glioma stem cell line HN6C-2. (a) Phase (b) DAPI (c) doxorubicin loaded gold nanoparticles and (d) overlaid	145
6B.20	Confocal microscopy images to demonstrate the apoptosis induced by doxorubicin loaded poly(ethylene glycol)-sophorolipid conjugated gold nanoparticles on (A) human glioma cell line LN-229 (B) human glioma stem cell line HNGC-2. (a) Phase (b) DAPI (c) doxorubicin loaded gold nanoparticles and (d) overlaid	145