

FIGURE 1

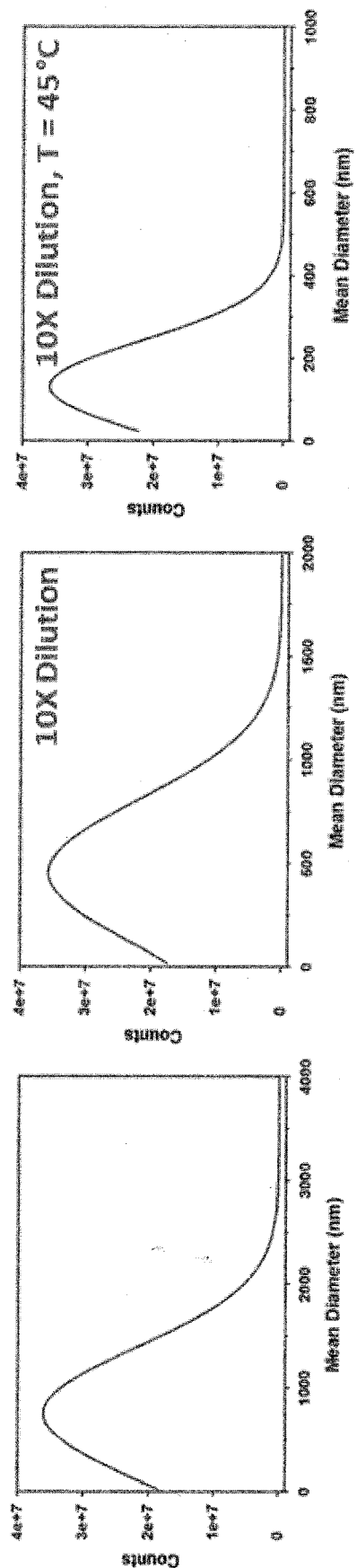
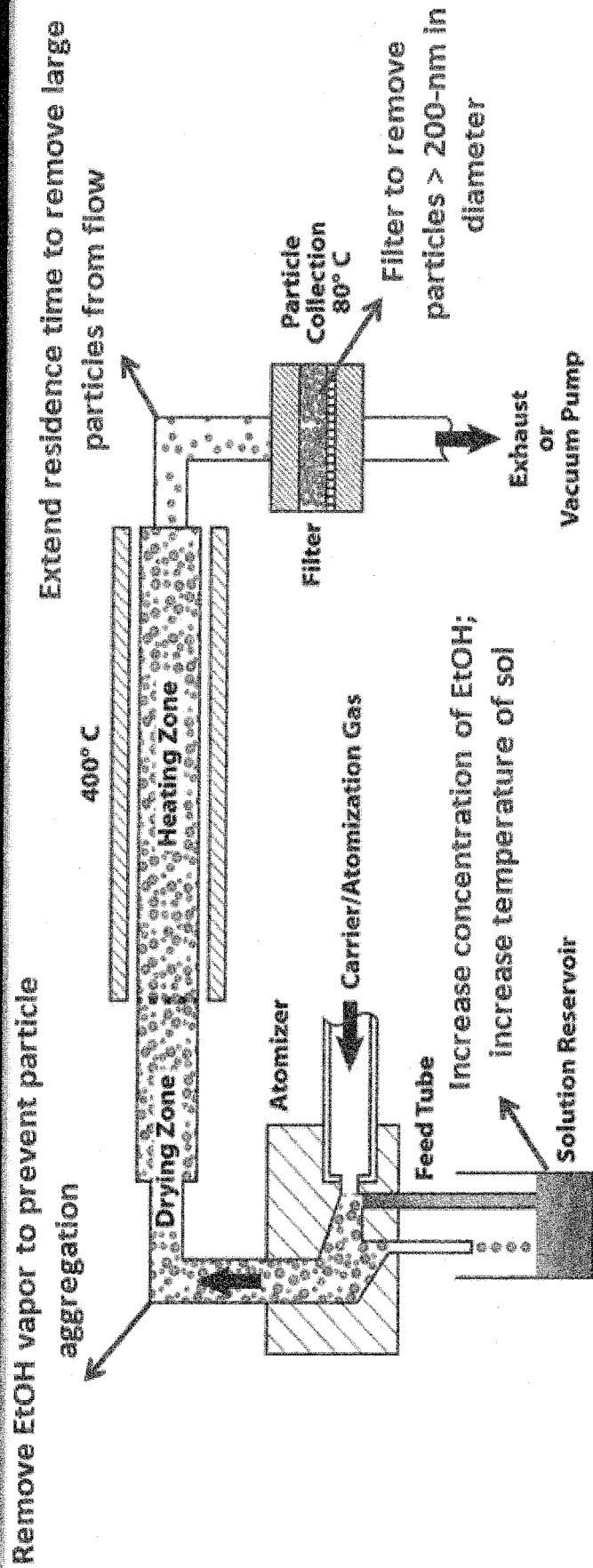


FIGURE 2
PORE SIZE AND FRAMEWORK DESIGN TAILORABLE FOR MULTIPLE TYPES OF CARGO –
Aerosolized Auxiliary Components (NPs) Easily Incorporated

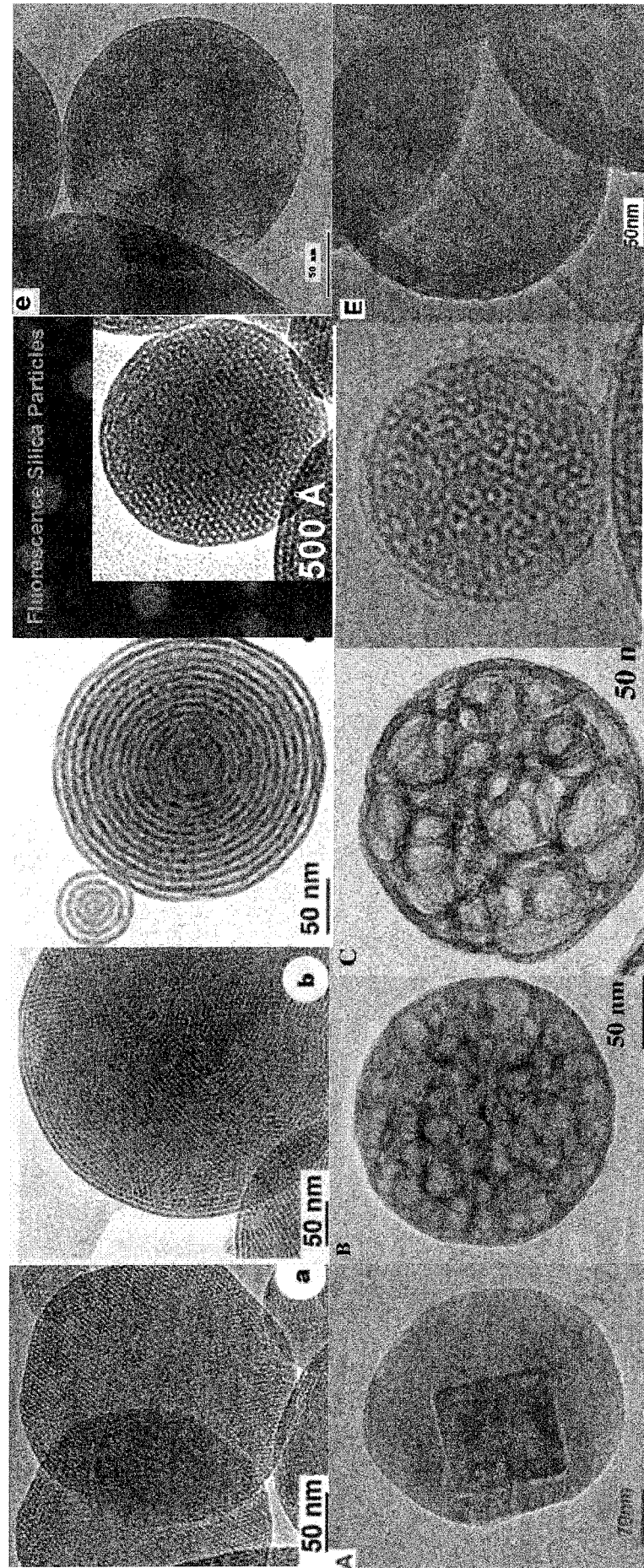


FIGURE 2A

Nanopore Templates	BET surface area, m ² /g	BJH pore diameter, nm	Pore volume, cc/g
CTAB	1256	1.8	0.588
Brij 56	514	4.1	0.557
F108+ Urea (55%wt)	1177	4.41	0.943
F108+ Urea (40%wt)	506	5.39	0.48
P123 + PPO(MW425)	323	6.5	0.53
F108	505	6.53	0.7
F108 + 19 nm PS	333	10.93	0.676
P123 +3.4% PPGA	190	12.7	0.60
F108 + glycerol monooleate+Urea	262	14.63	0.649
Microemulsion	100	Bimodal, 5, 10-30nm	1.1

FIGURE 3

$(\text{RO})_{4-x}\text{Si-OH}_x$ (silicic acids)



FIGURE 4

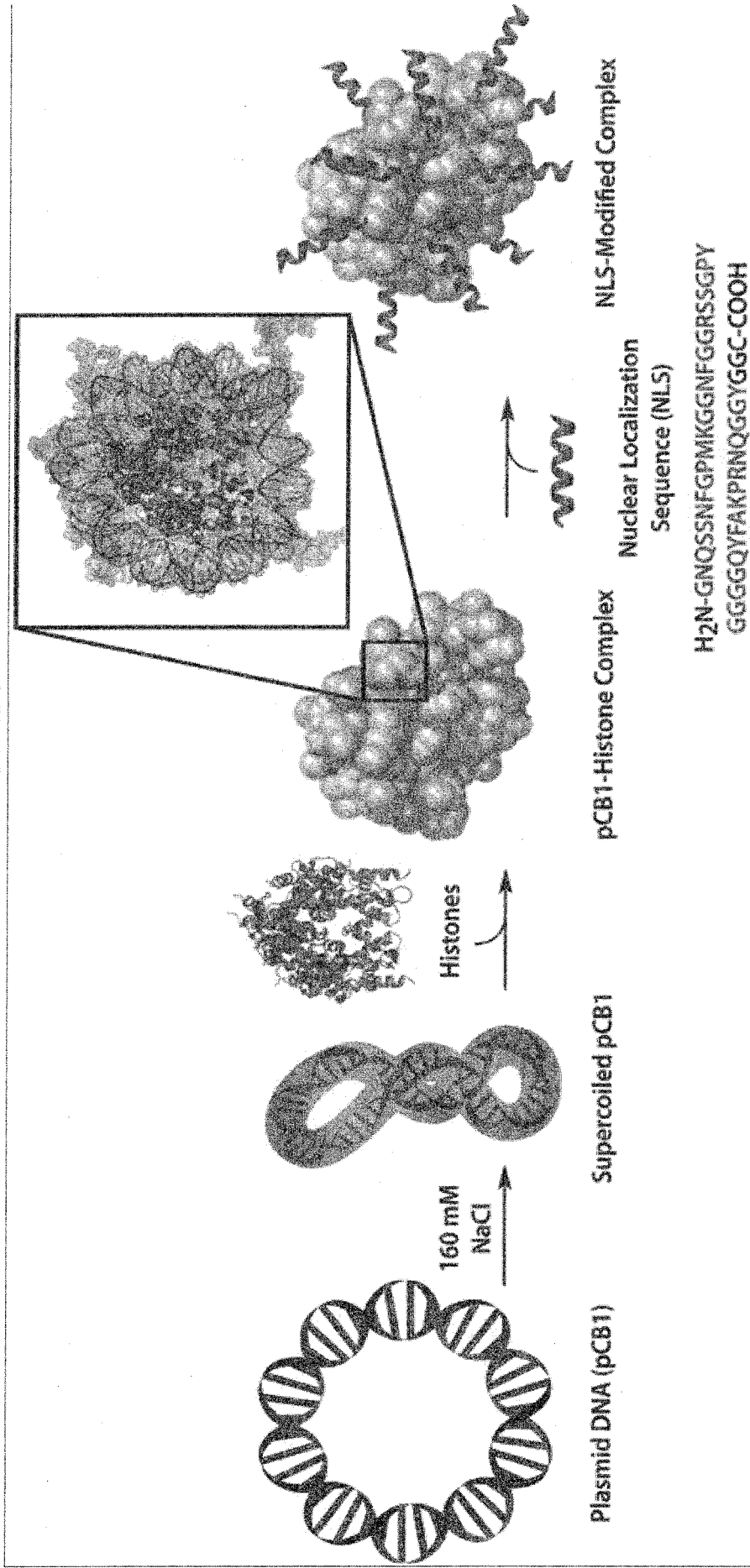
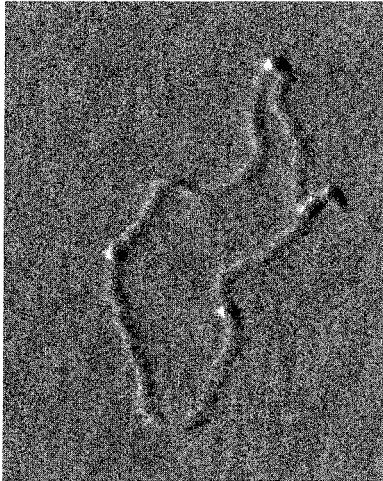
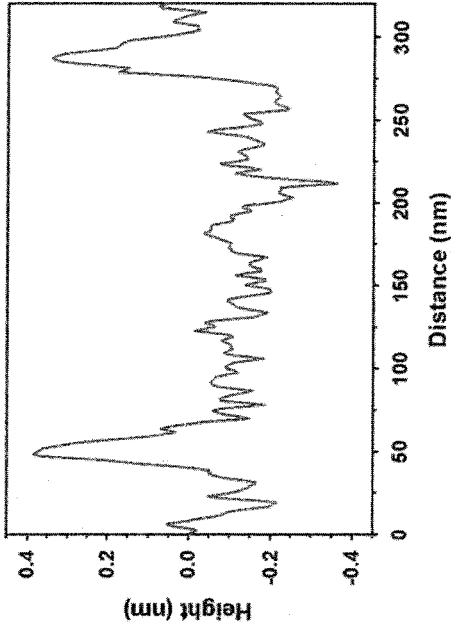


FIGURE 4 (CONT'D)

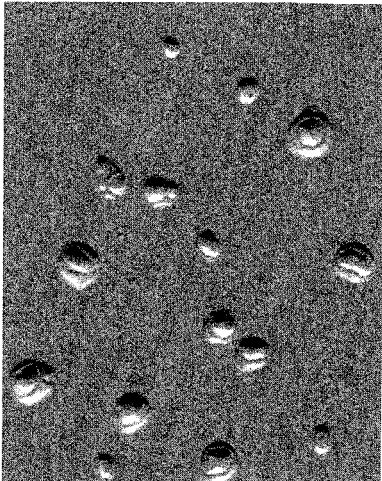
B



C



D



E

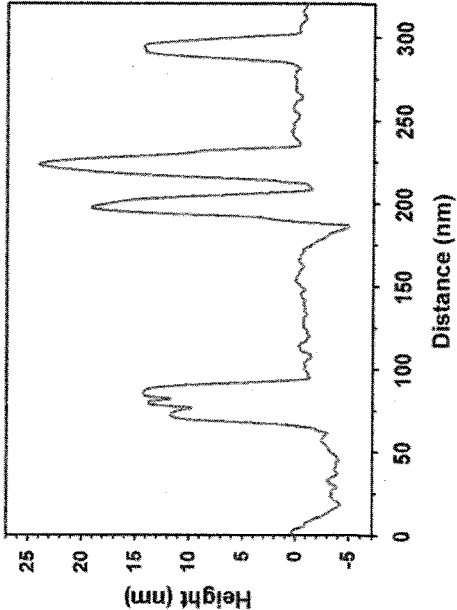


FIGURE 5

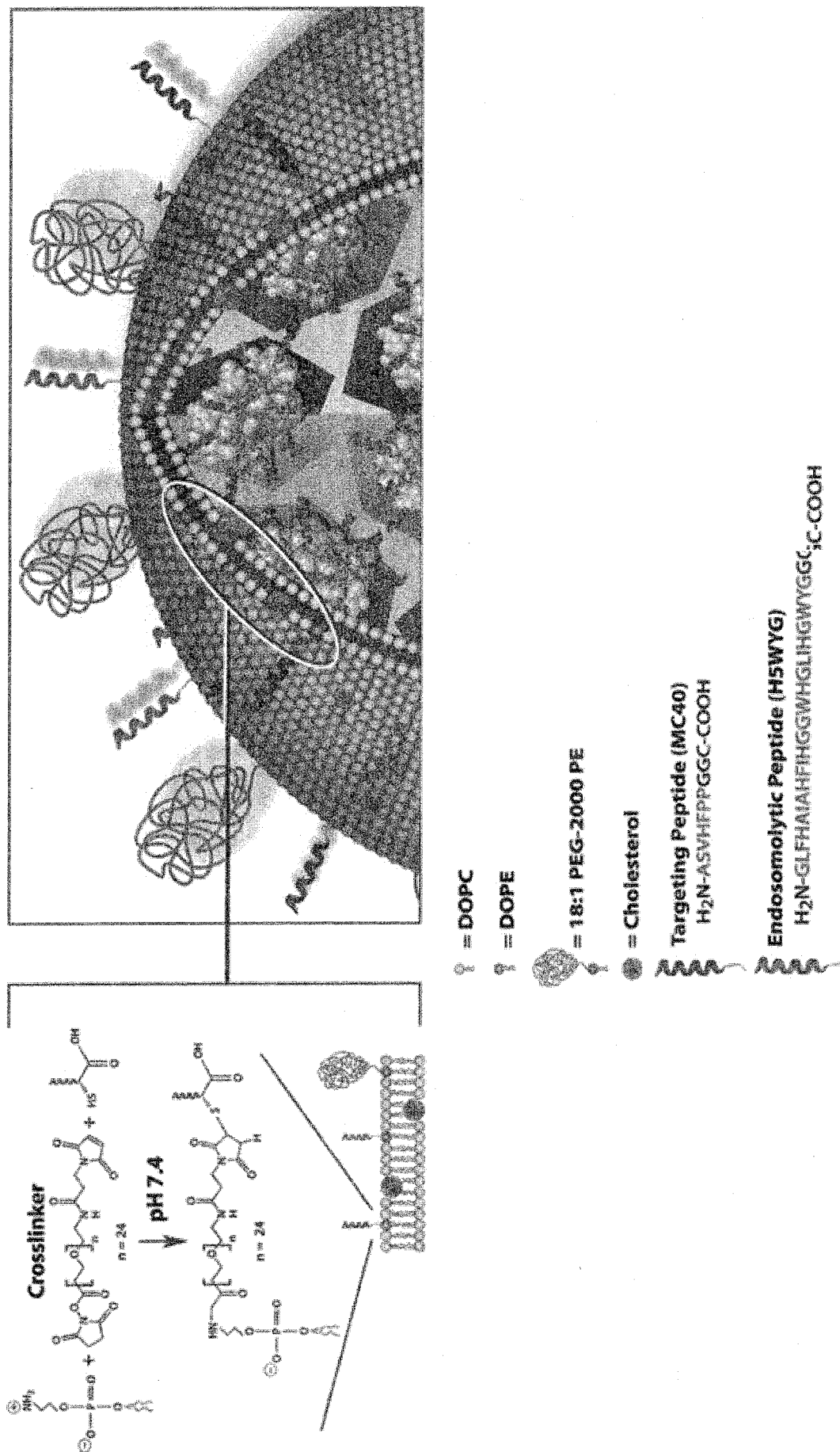


FIGURE 5 (CONT'D)

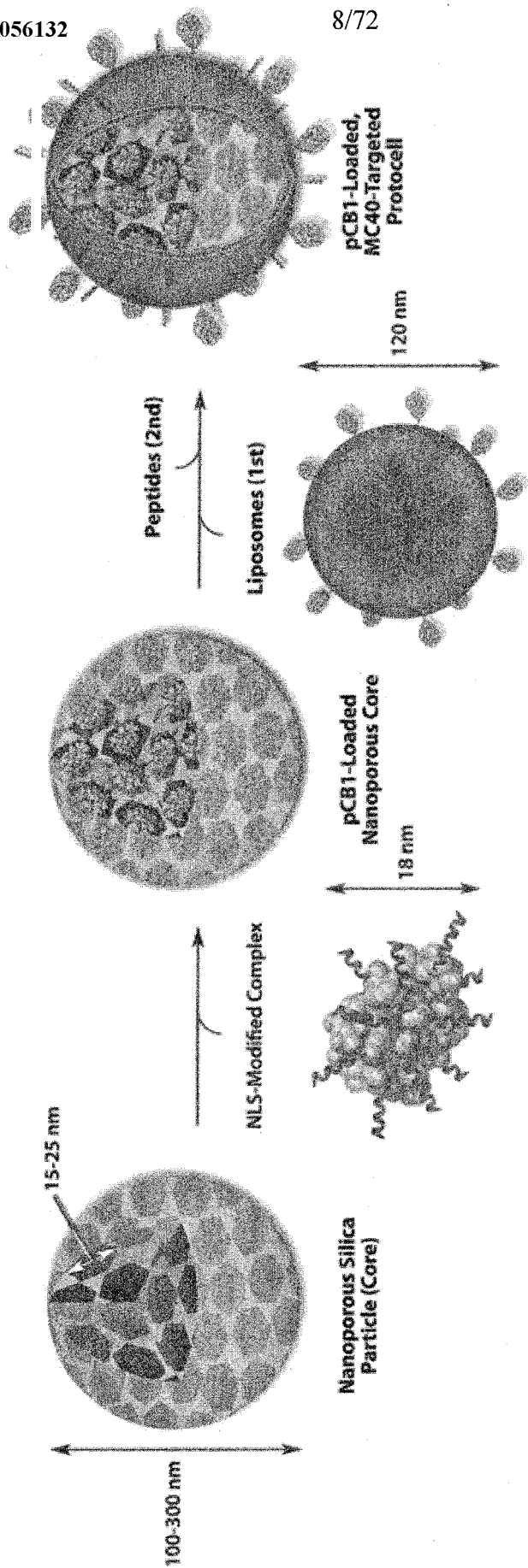
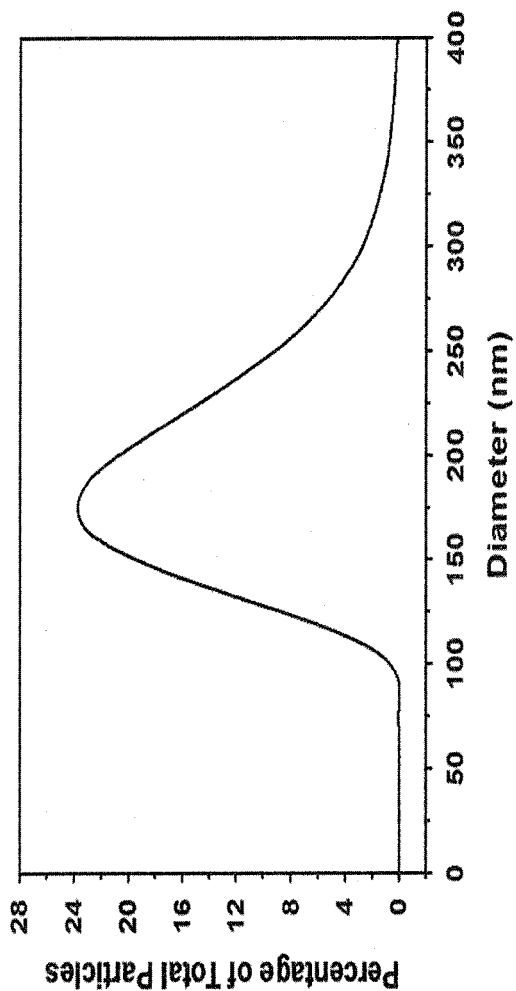
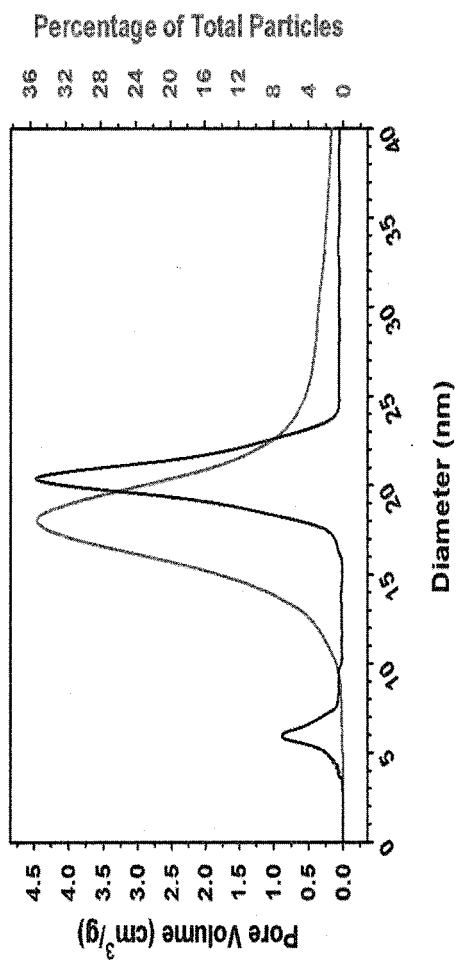
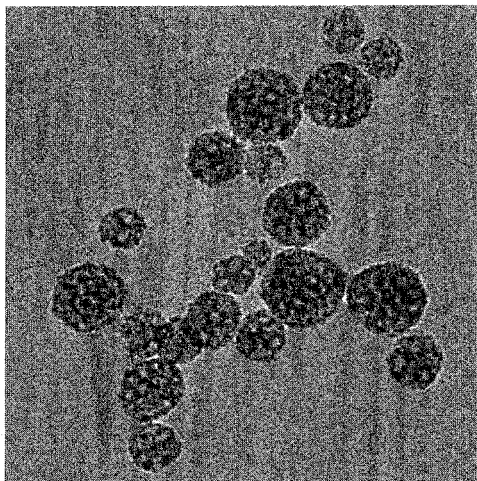


FIGURE 5 (CONT'D)
C



B



D

FIGURE 6

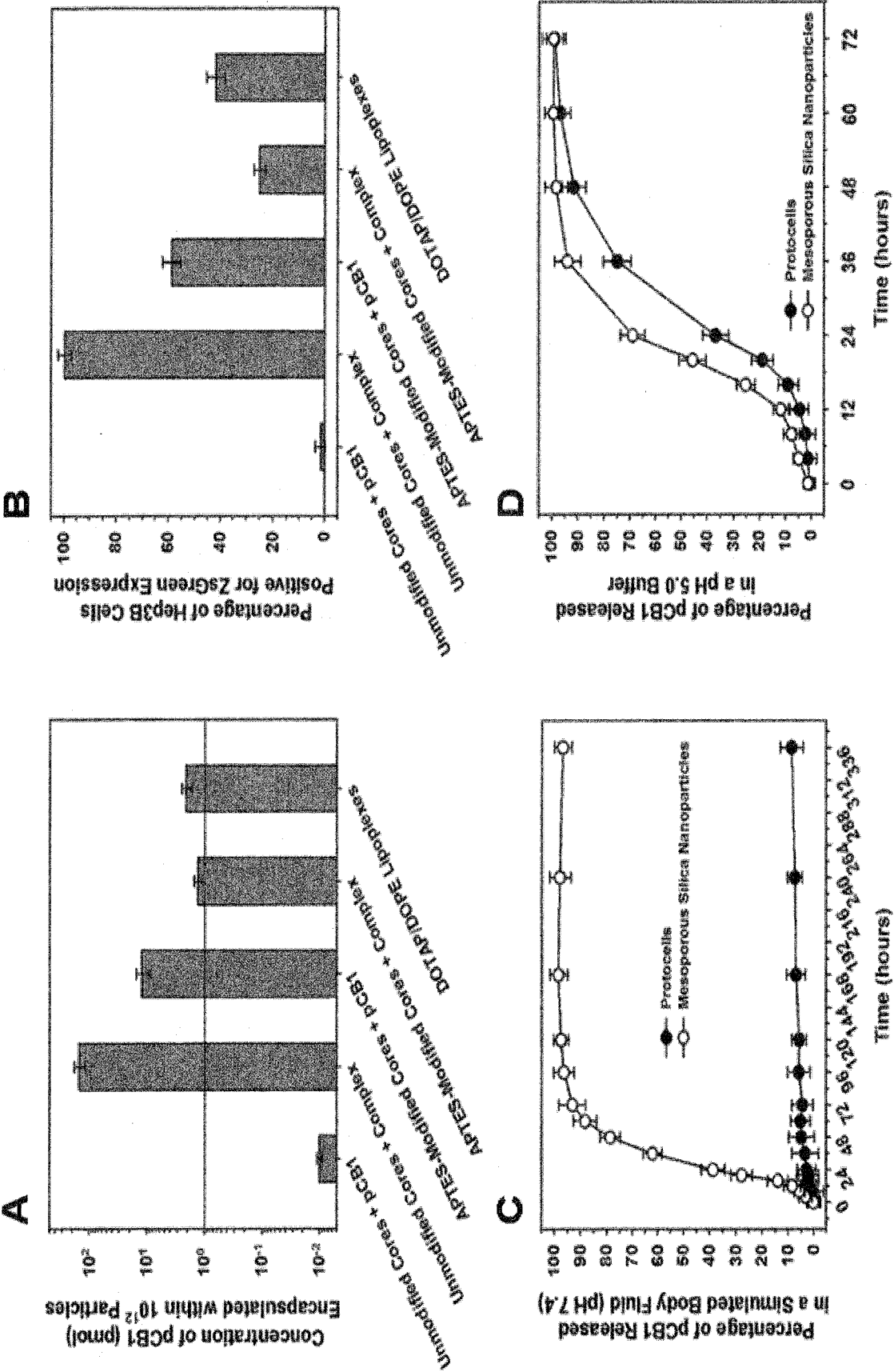


FIGURE 7

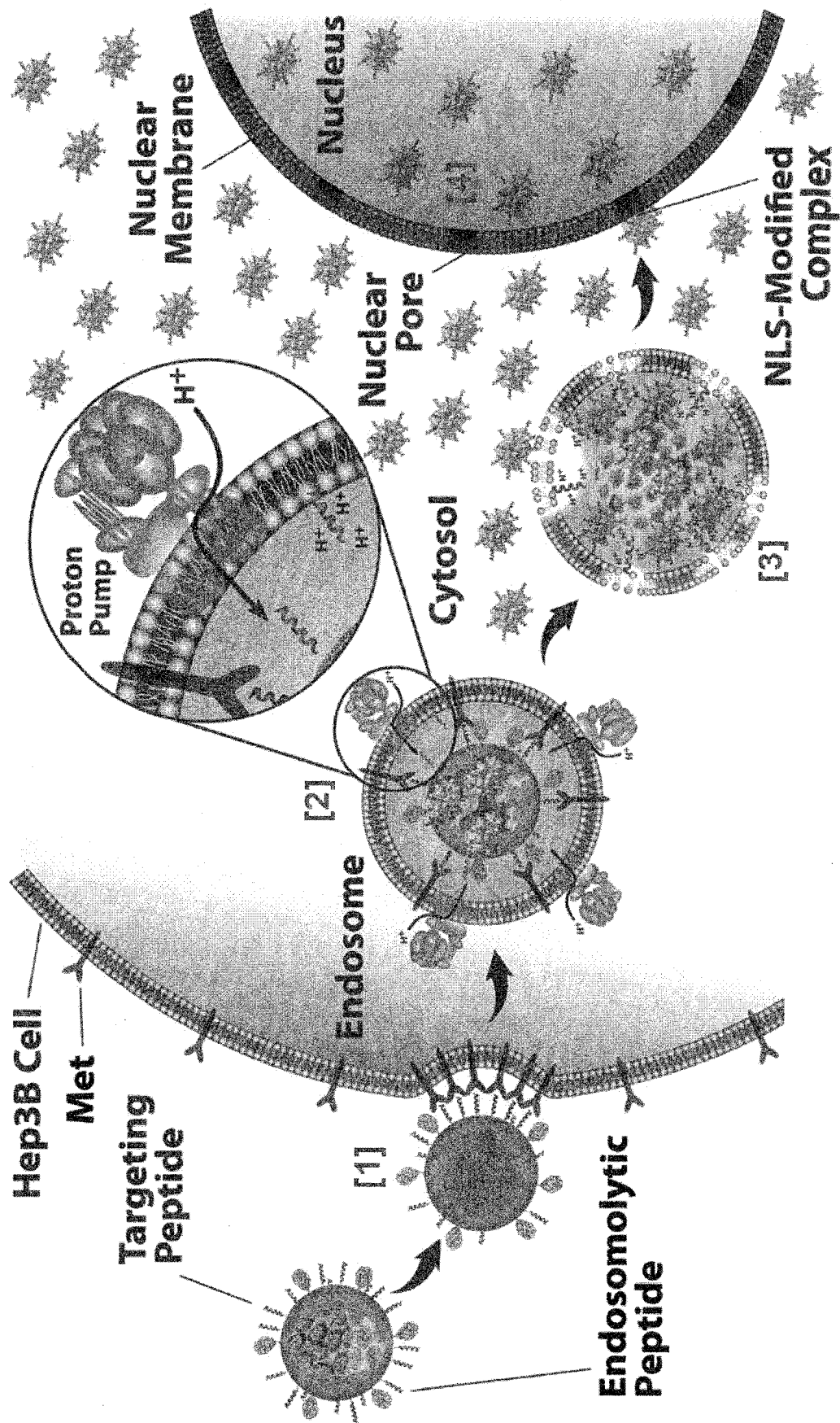


FIGURE 8

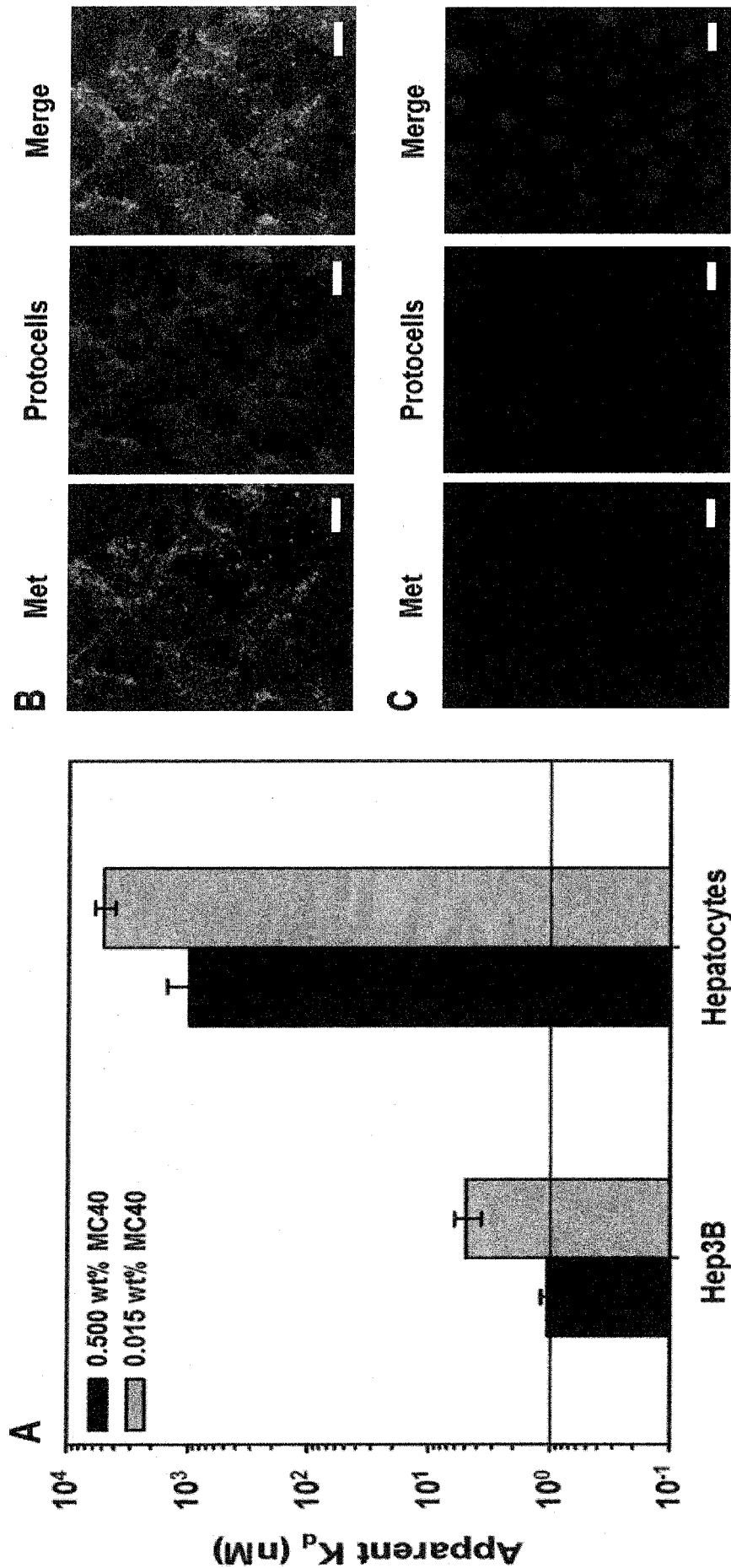


FIGURE 9

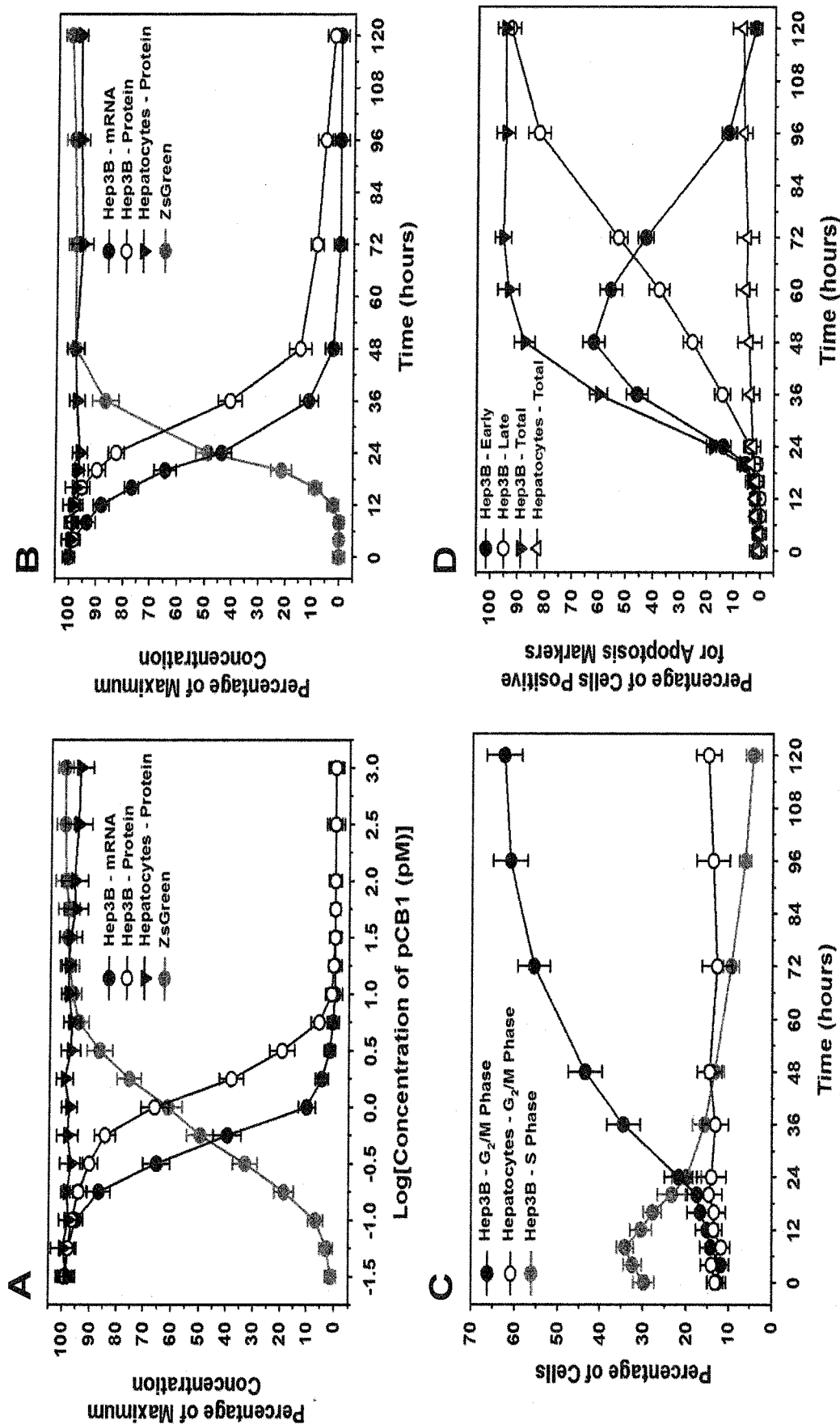


FIGURE 10

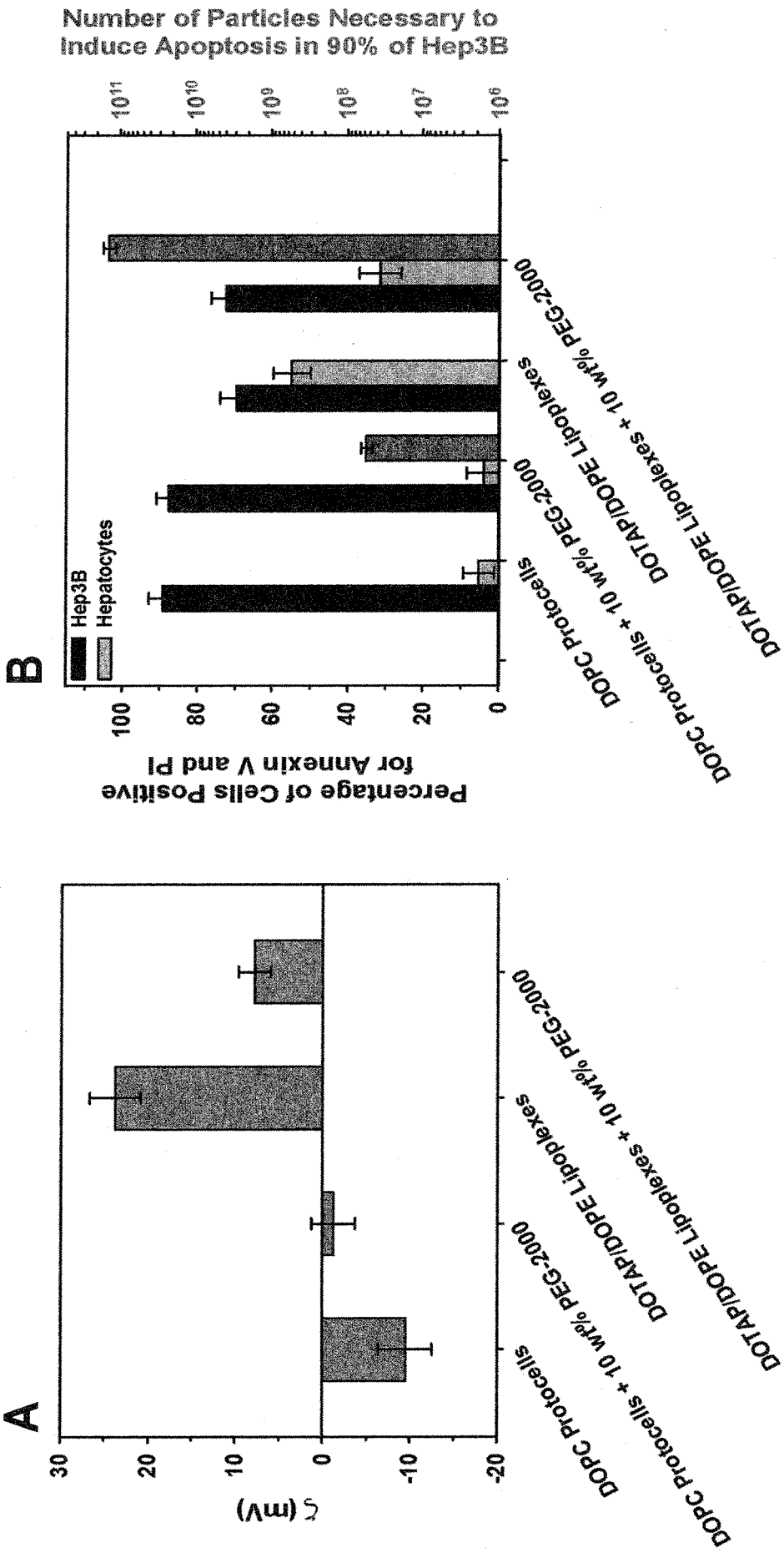


FIGURE 11

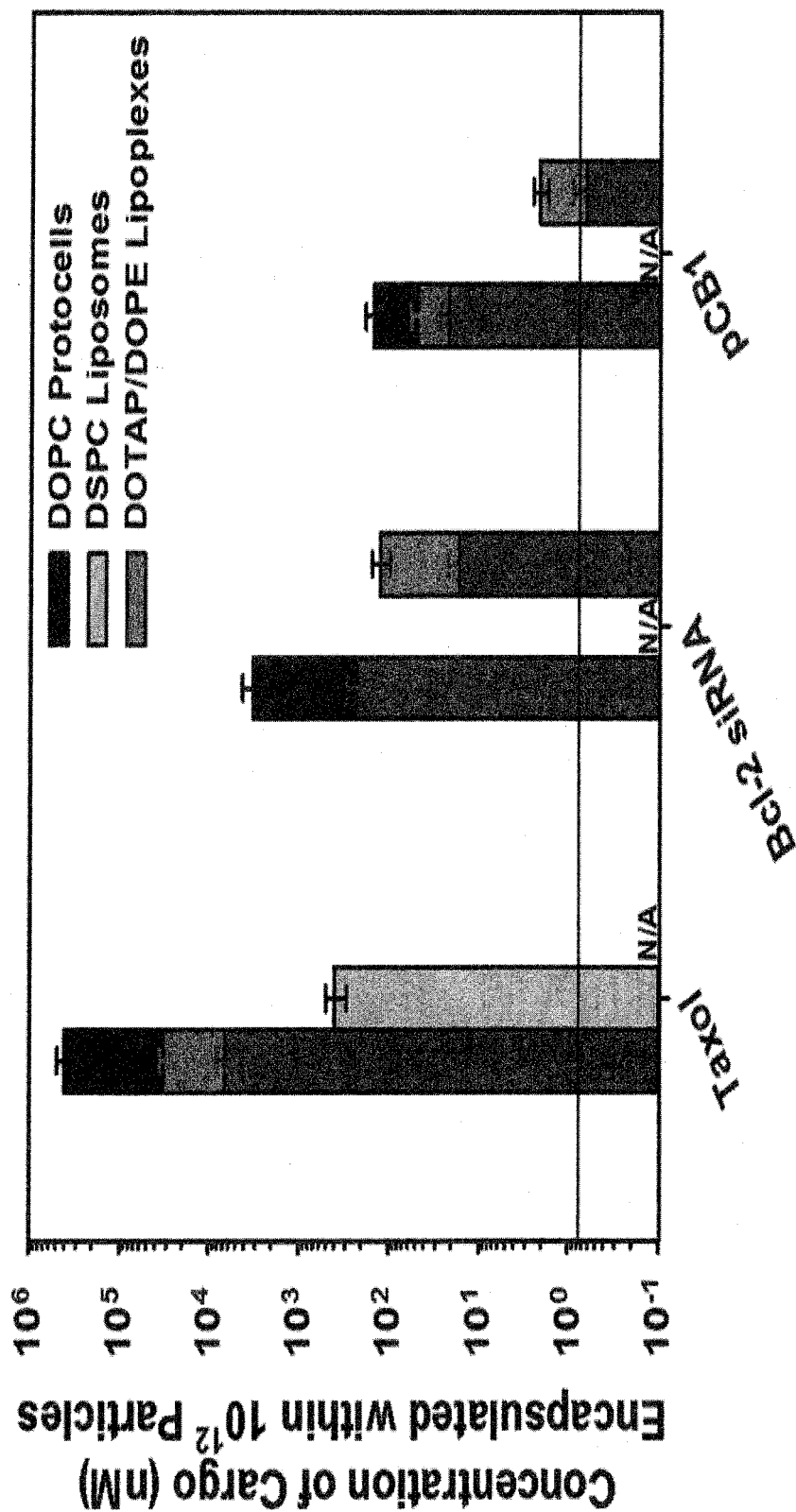


FIGURE 11 (CONT'D)

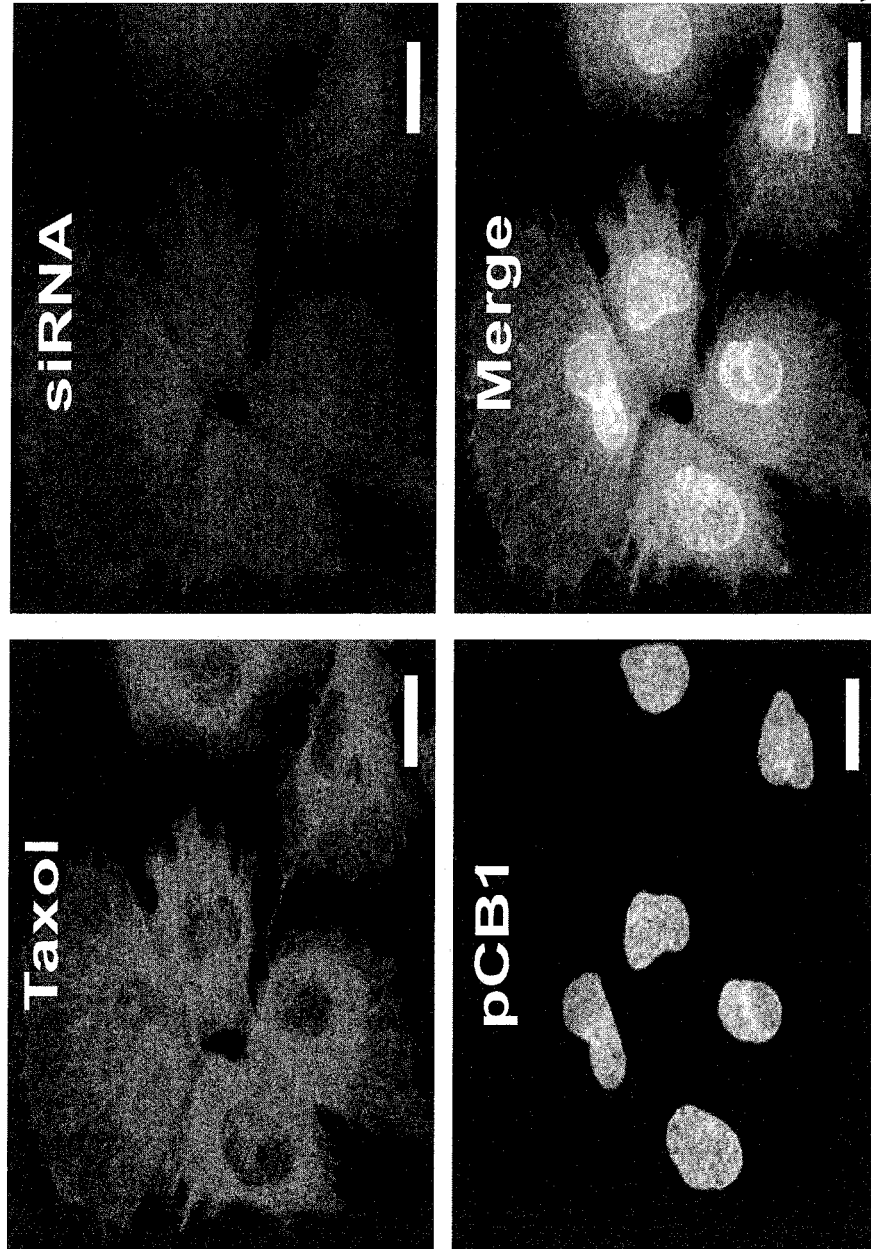


FIGURE 11 (CONT'D)

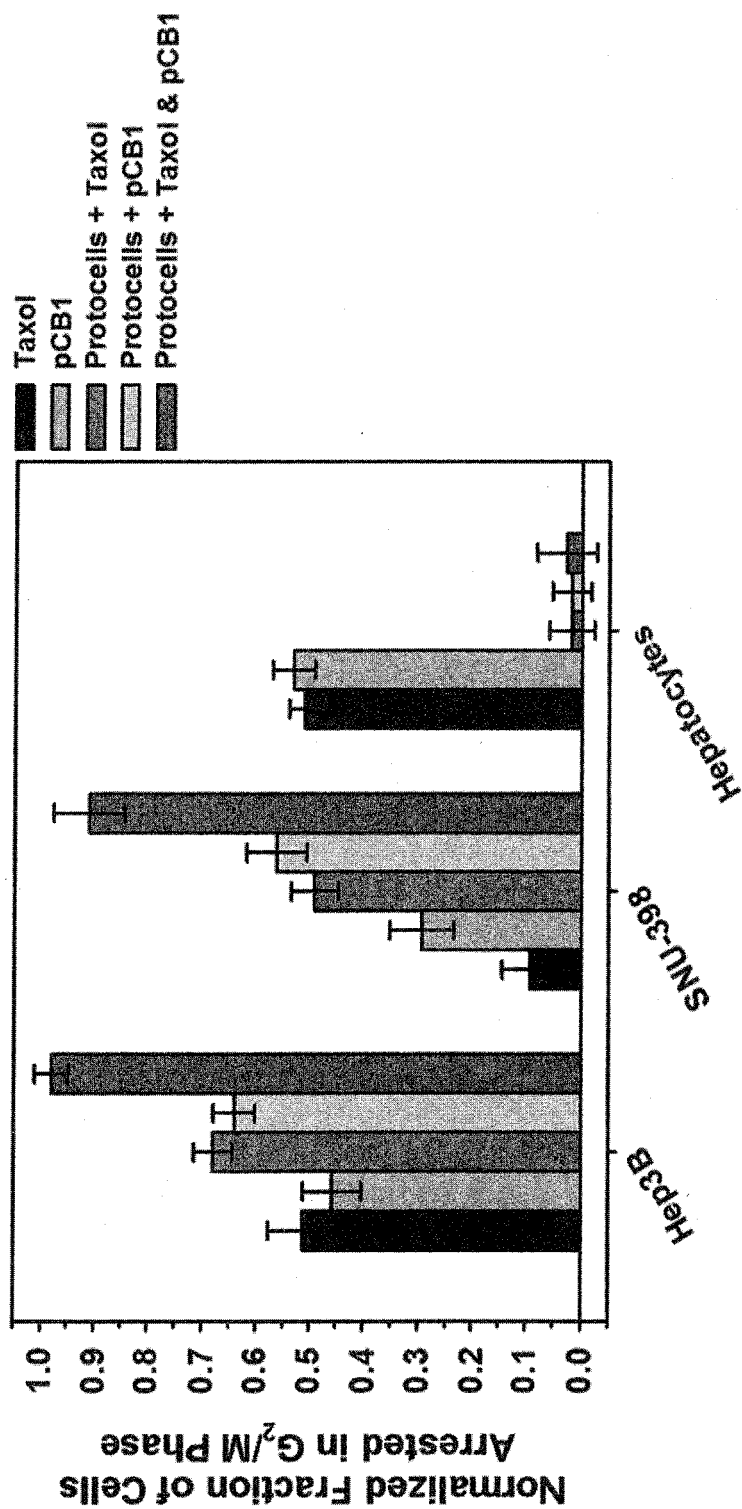


FIGURE 11 (CONT'D)

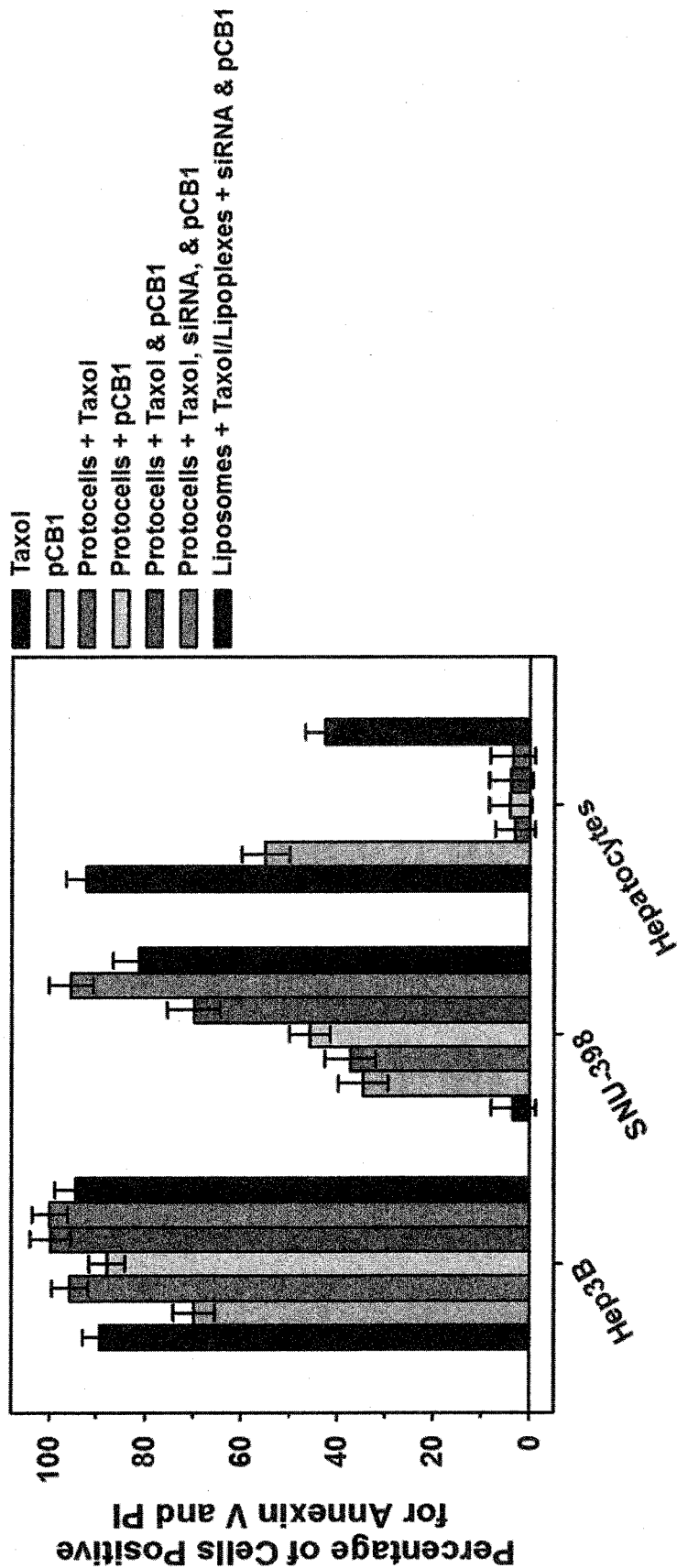


FIGURE 12

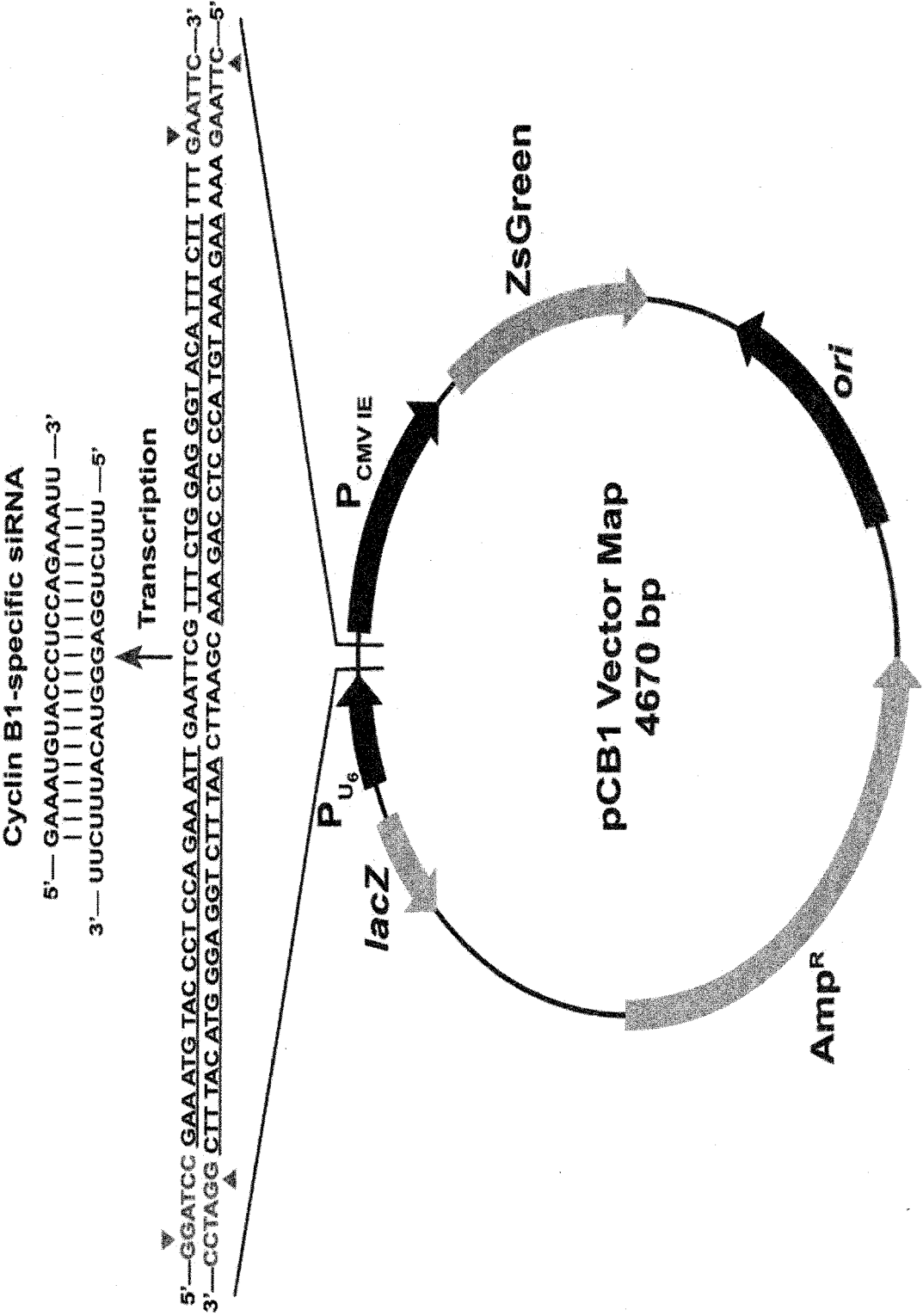


FIGURE 13

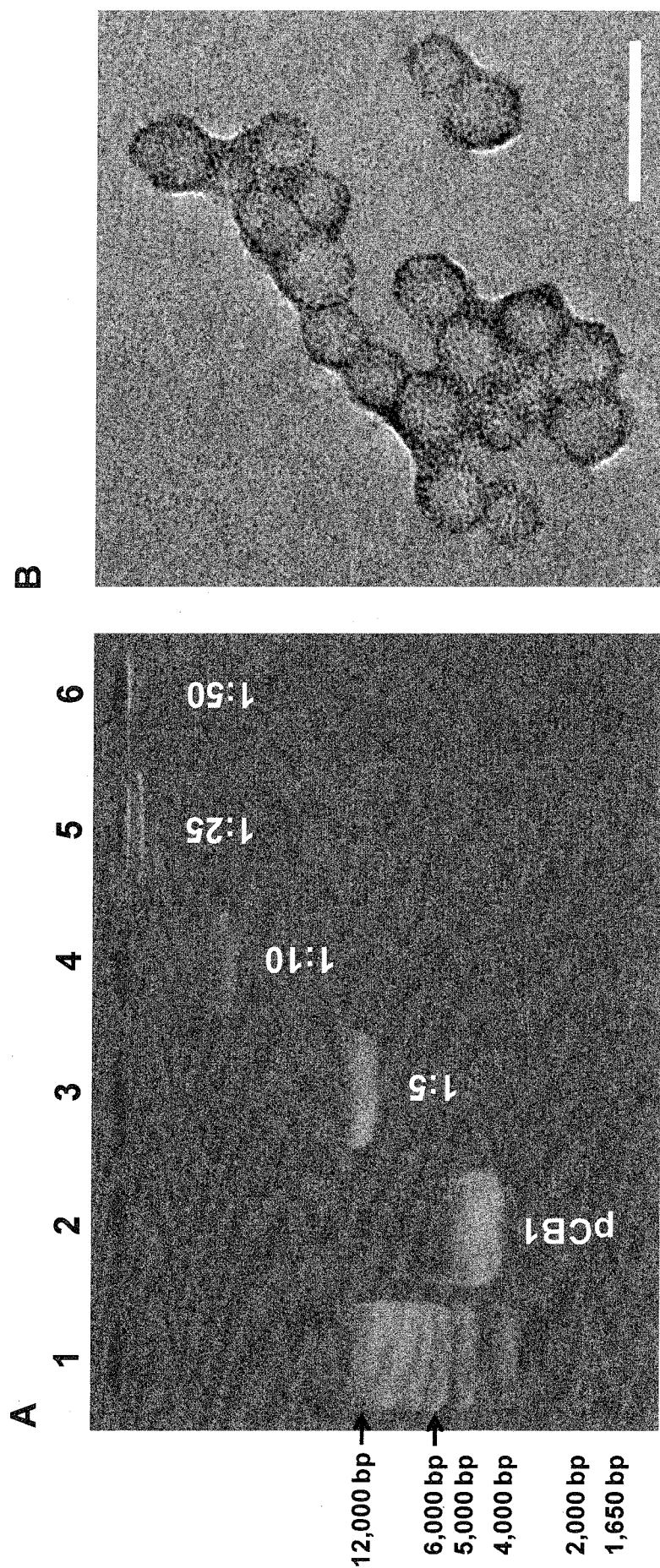


FIGURE 14

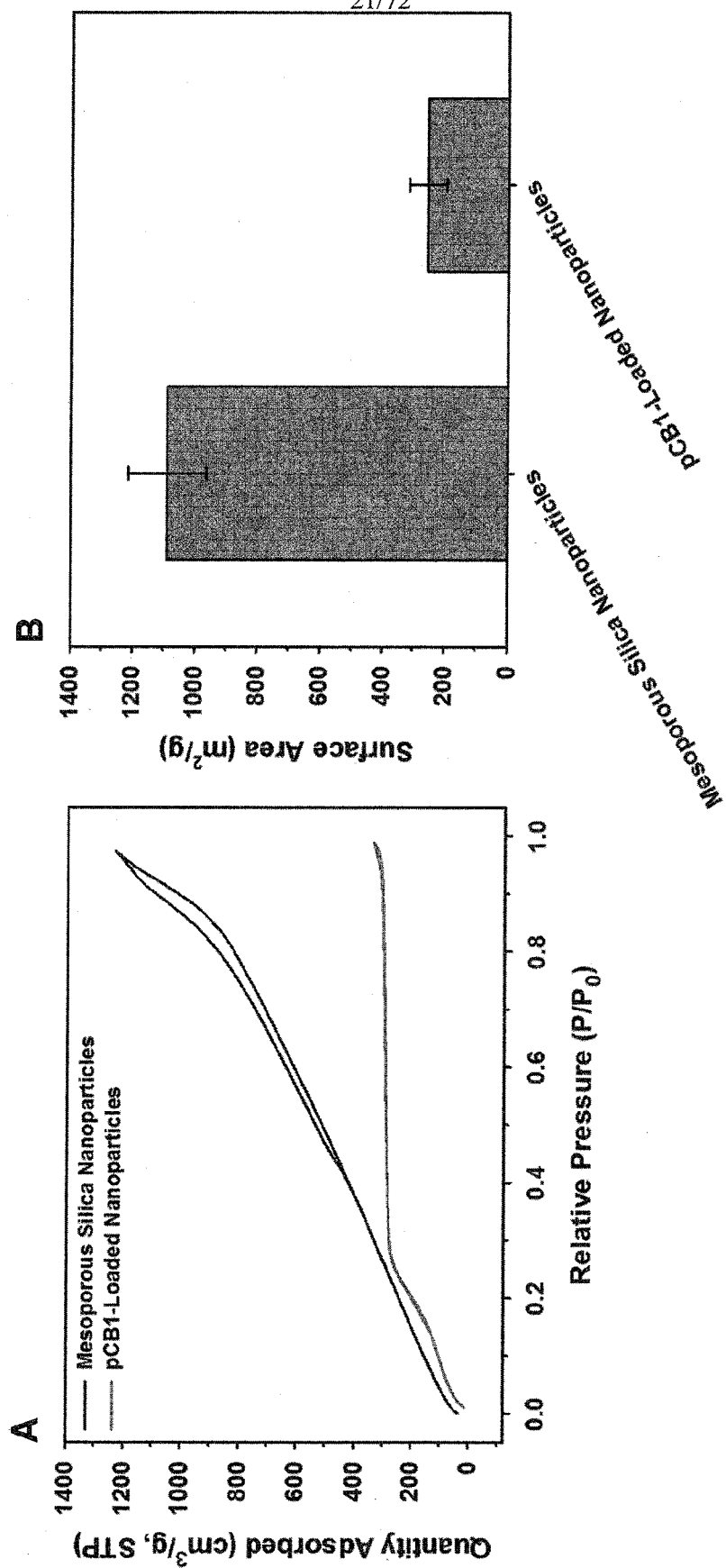


FIGURE 15

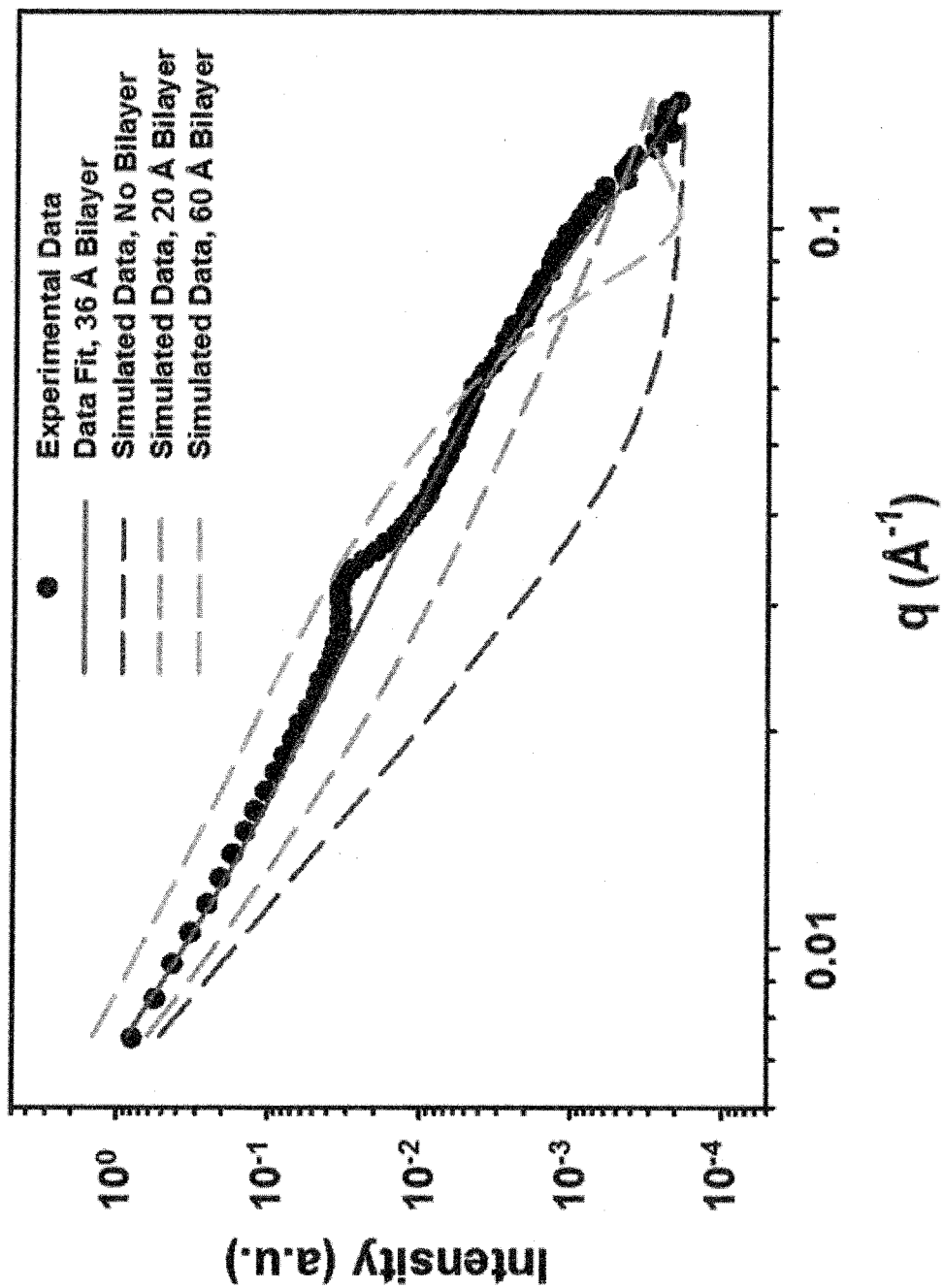


FIGURE 16

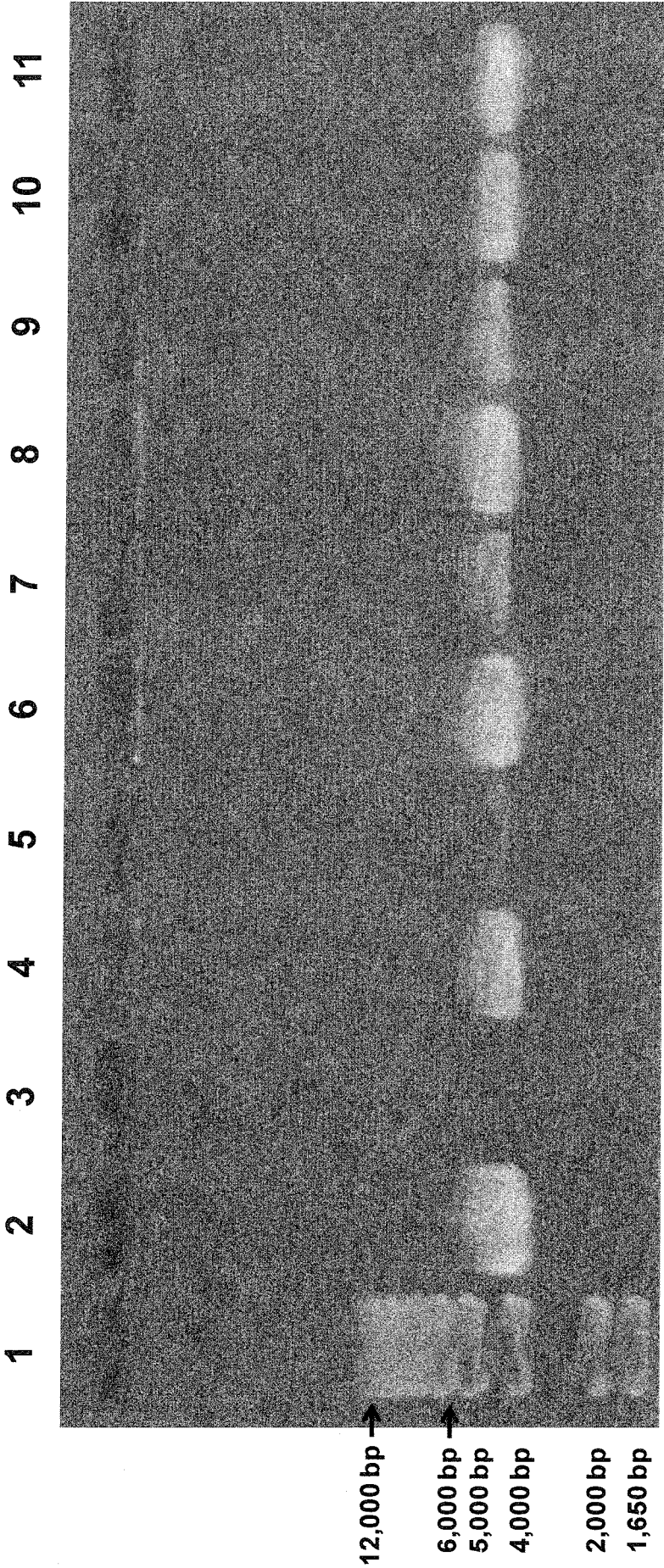


FIGURE 17

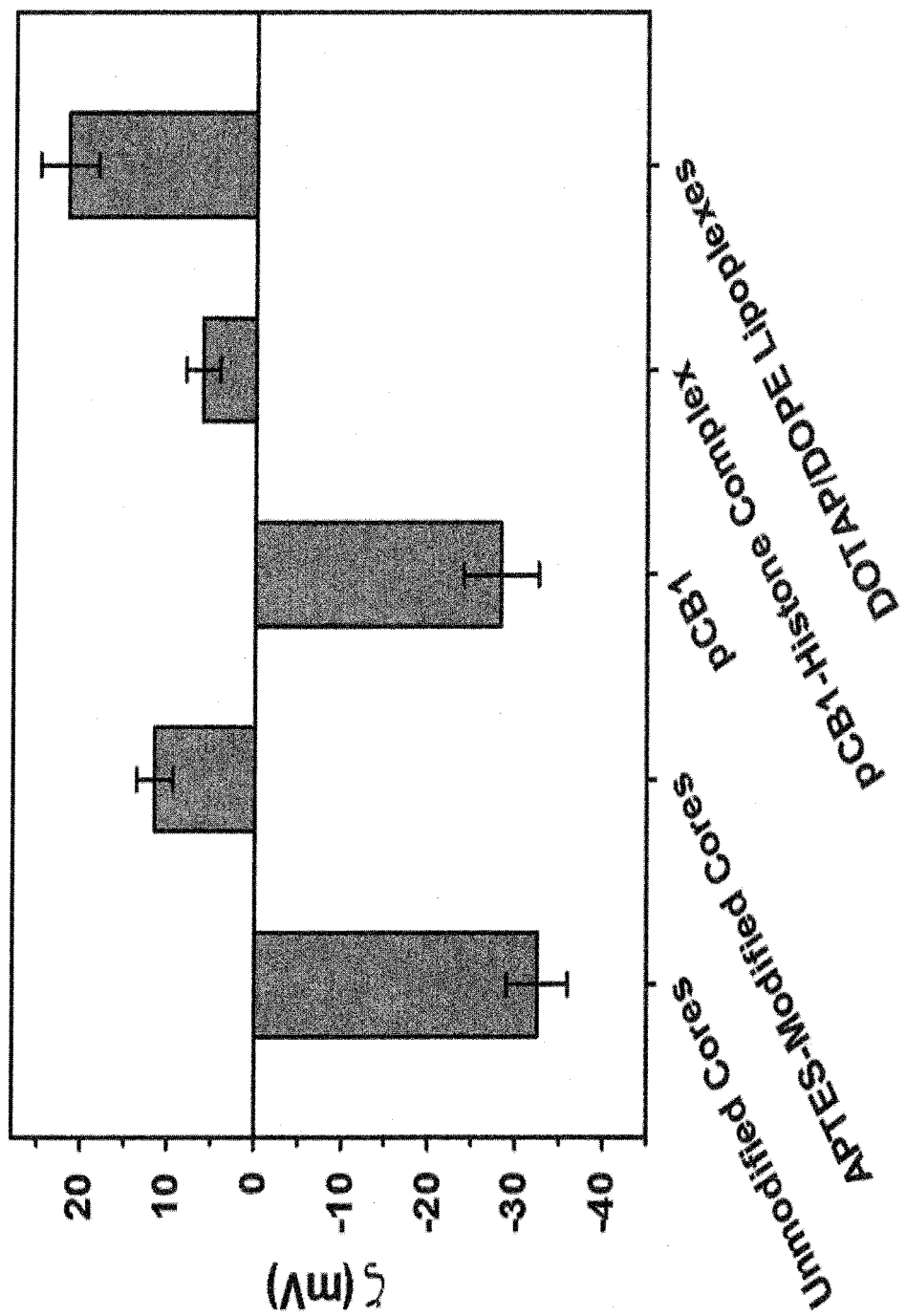


FIGURE 18

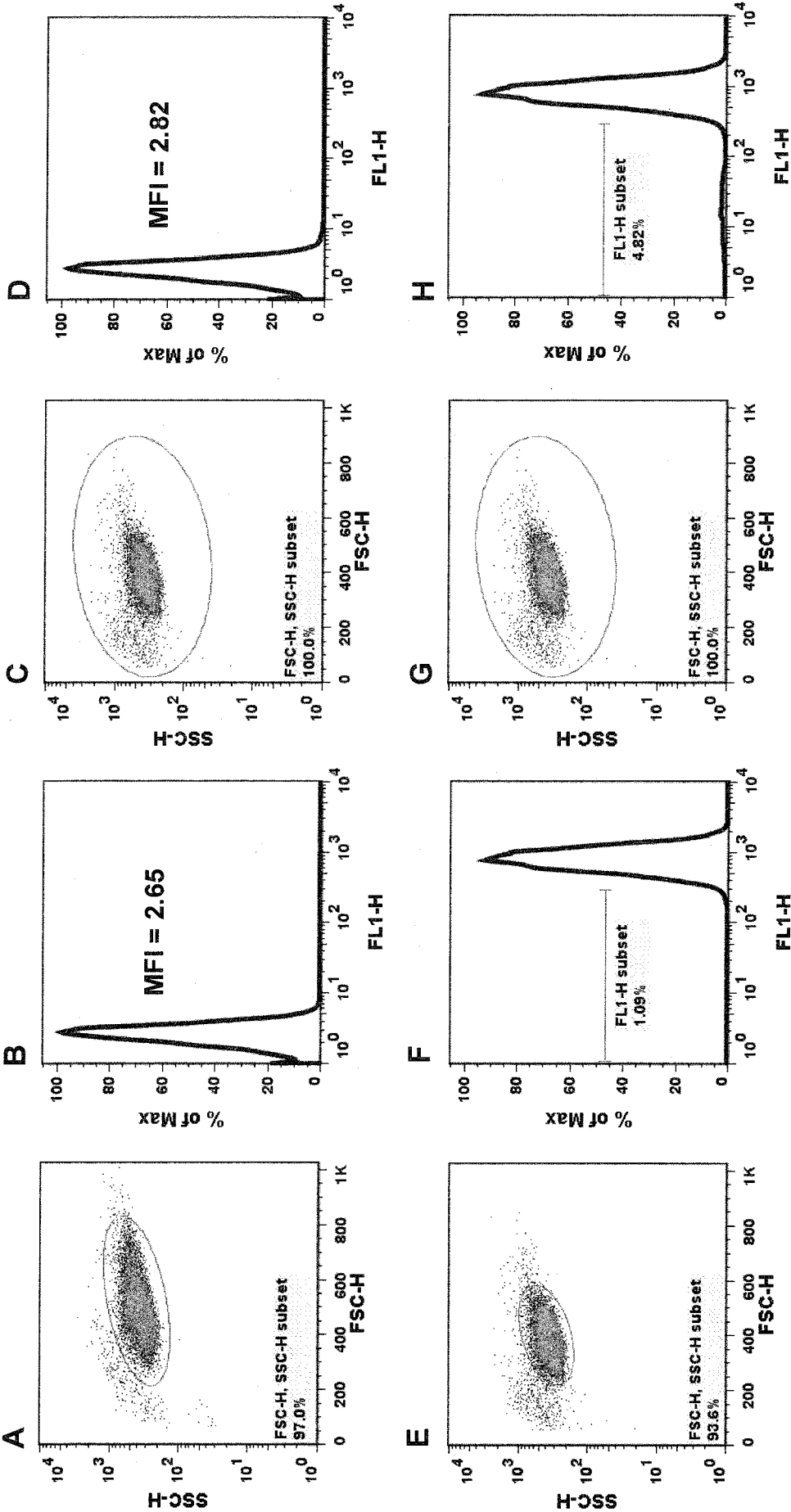


FIGURE 19

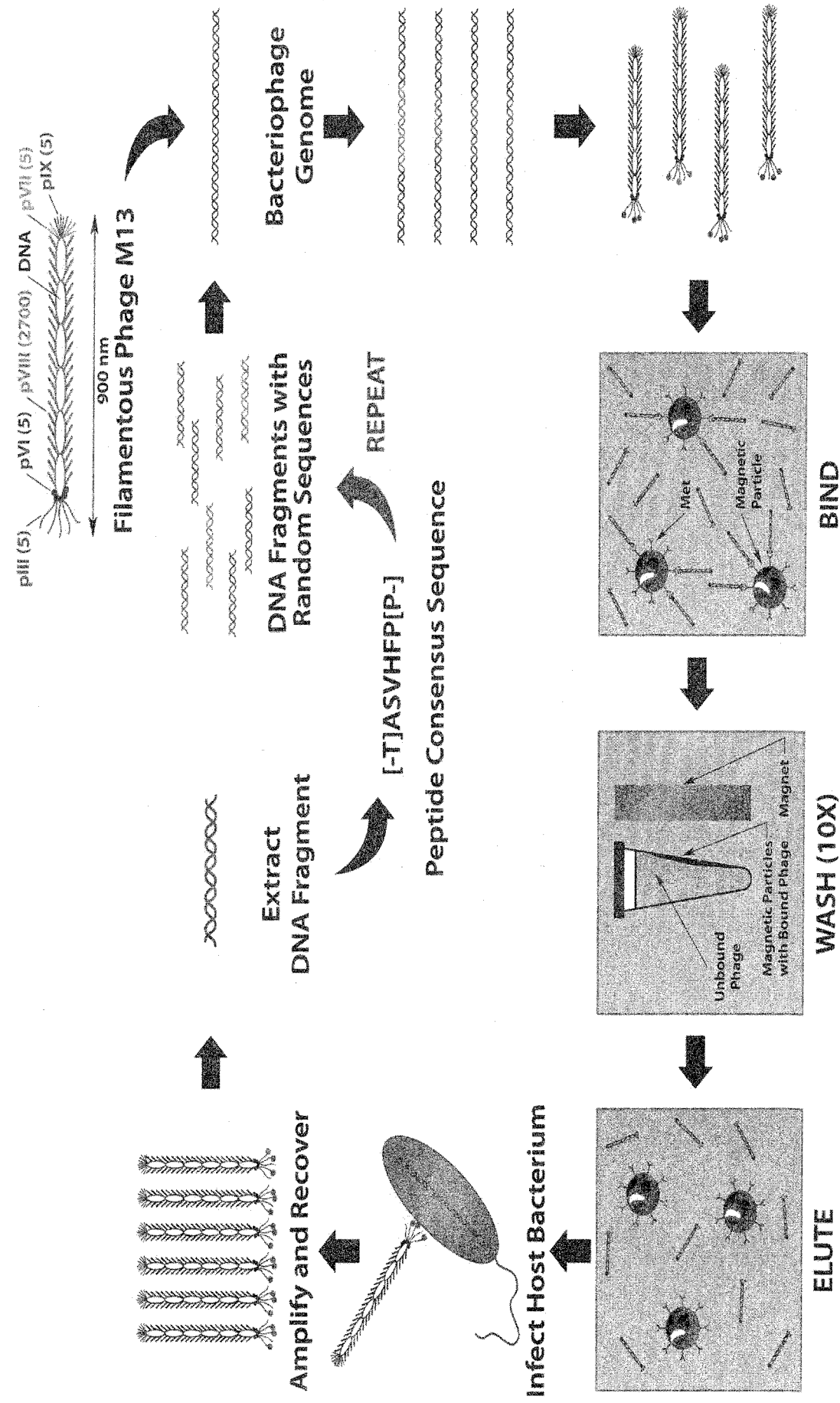


FIGURE 20

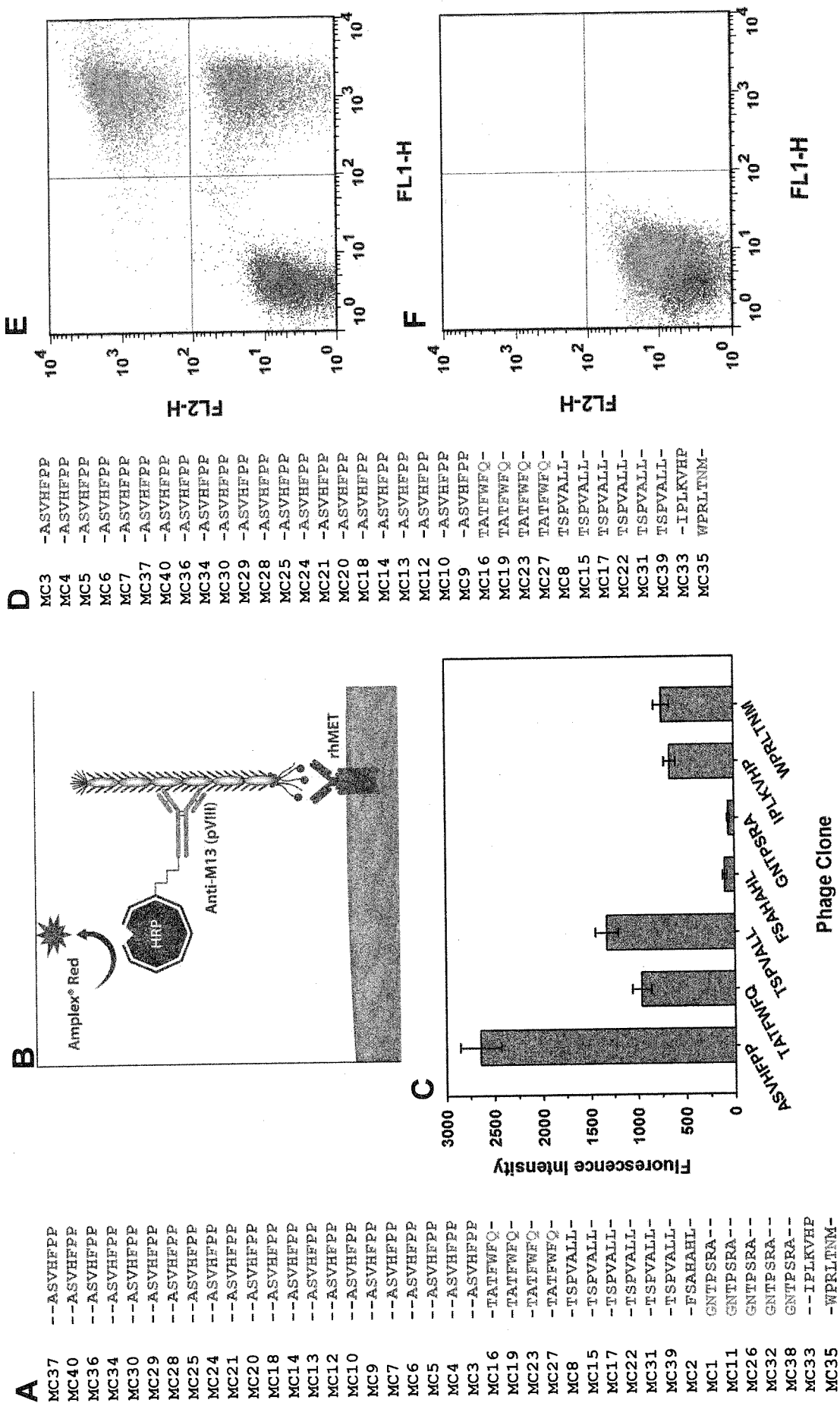


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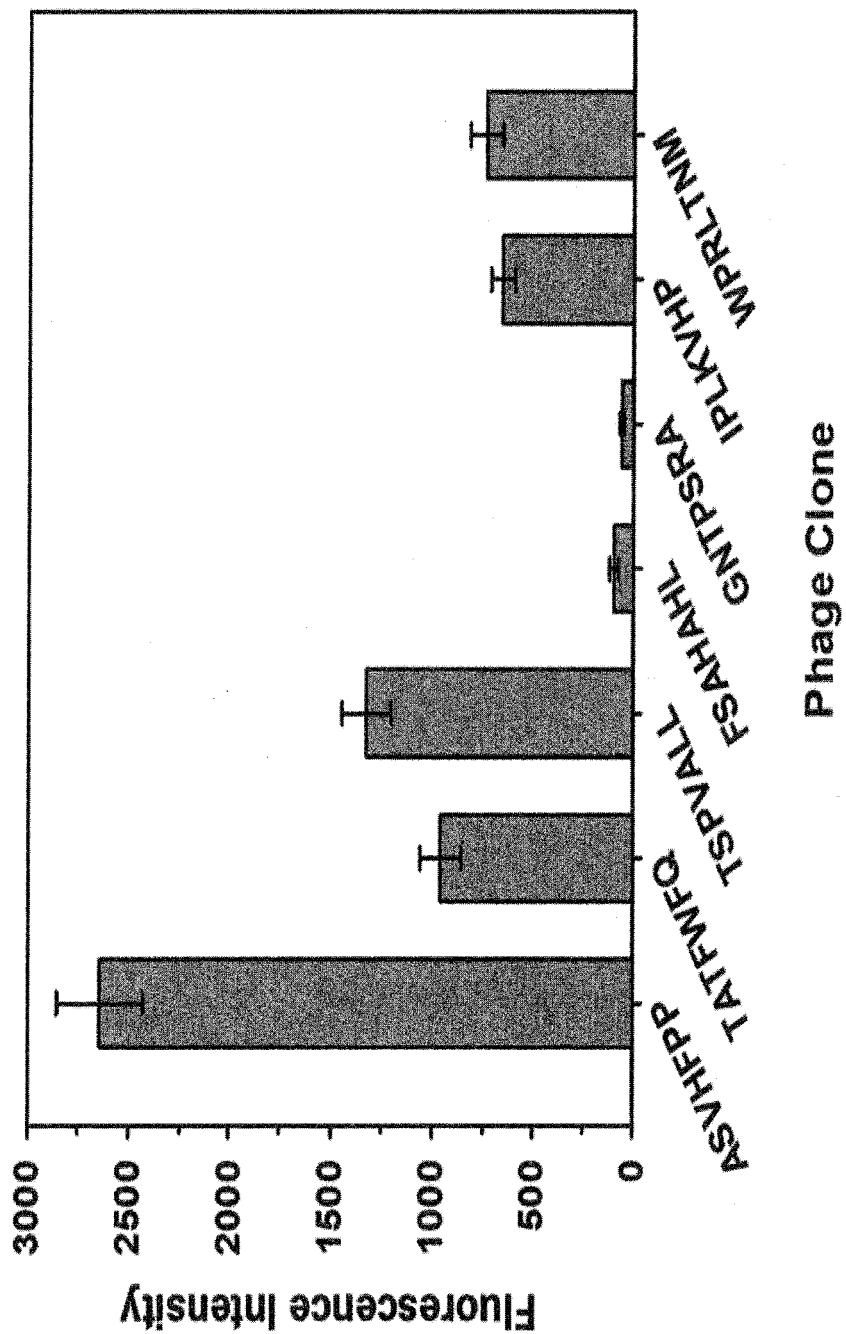


FIGURE 21

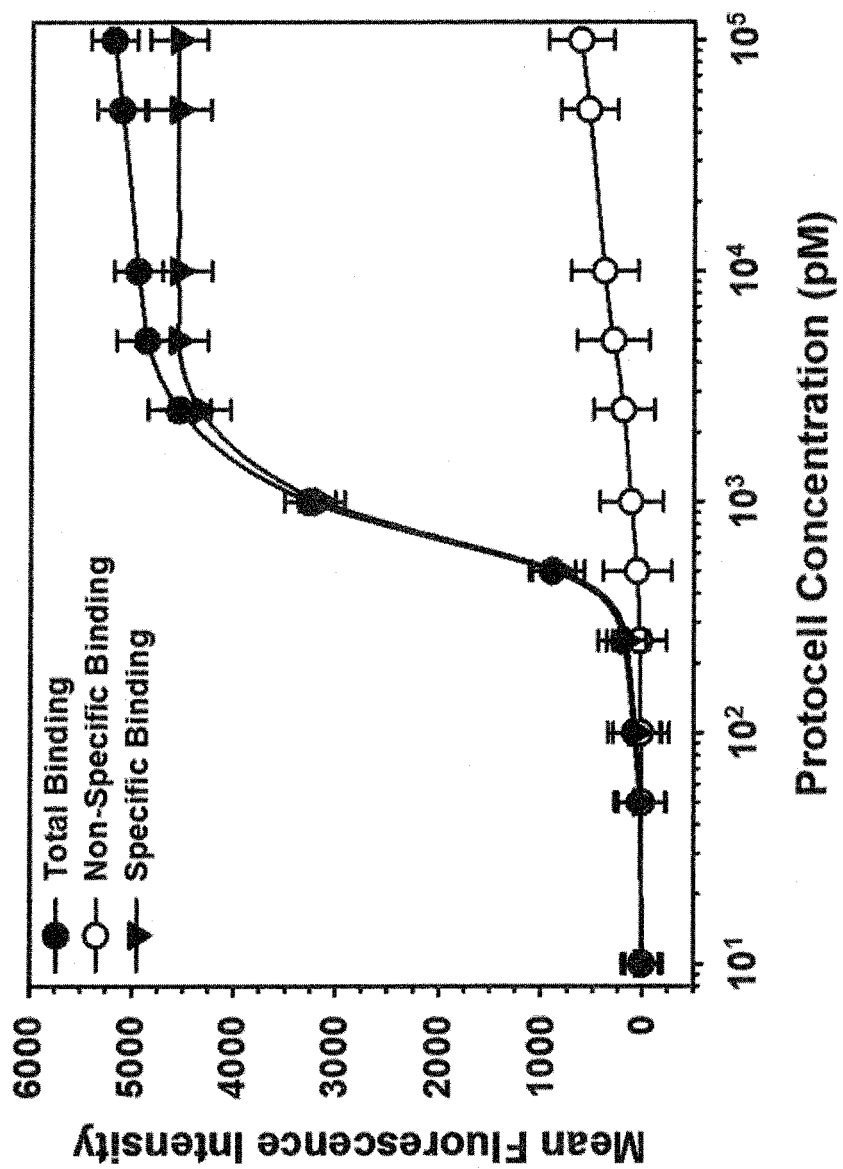


FIGURE 22

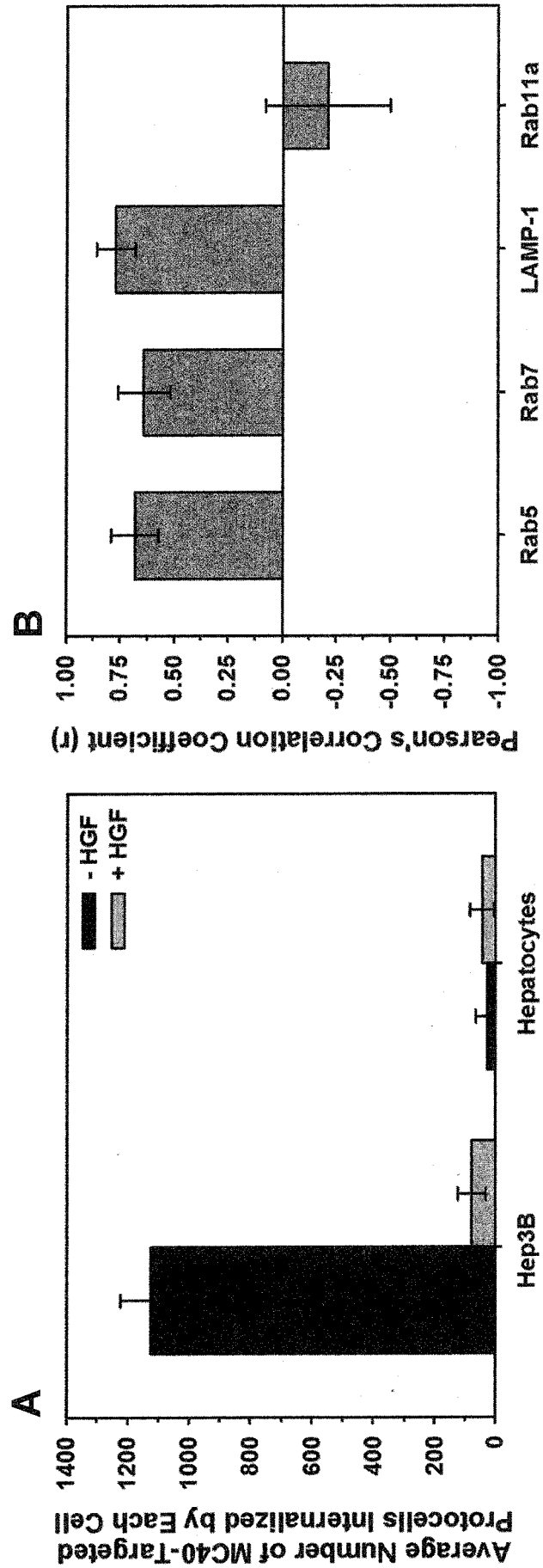


FIGURE 23

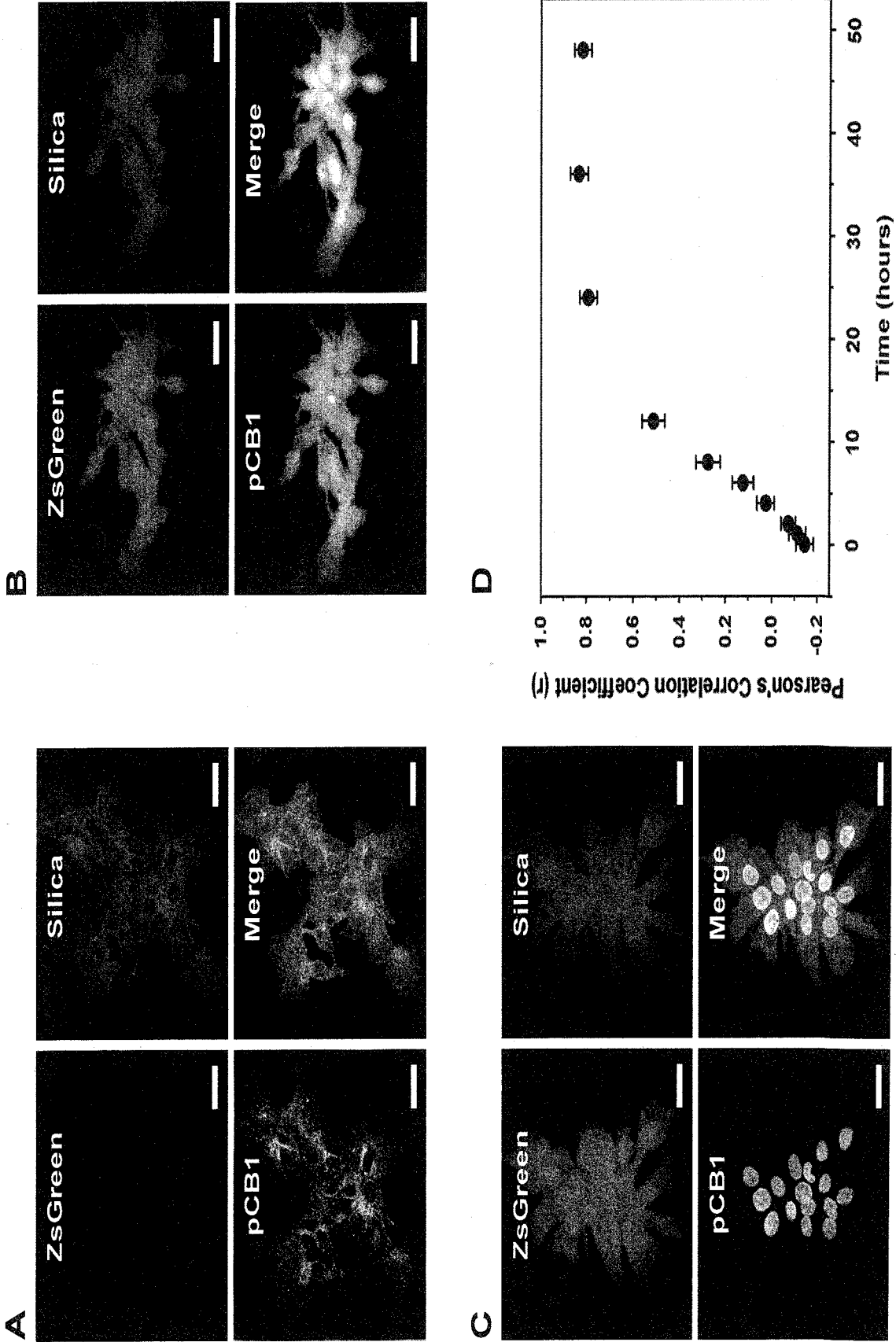


FIGURE 24

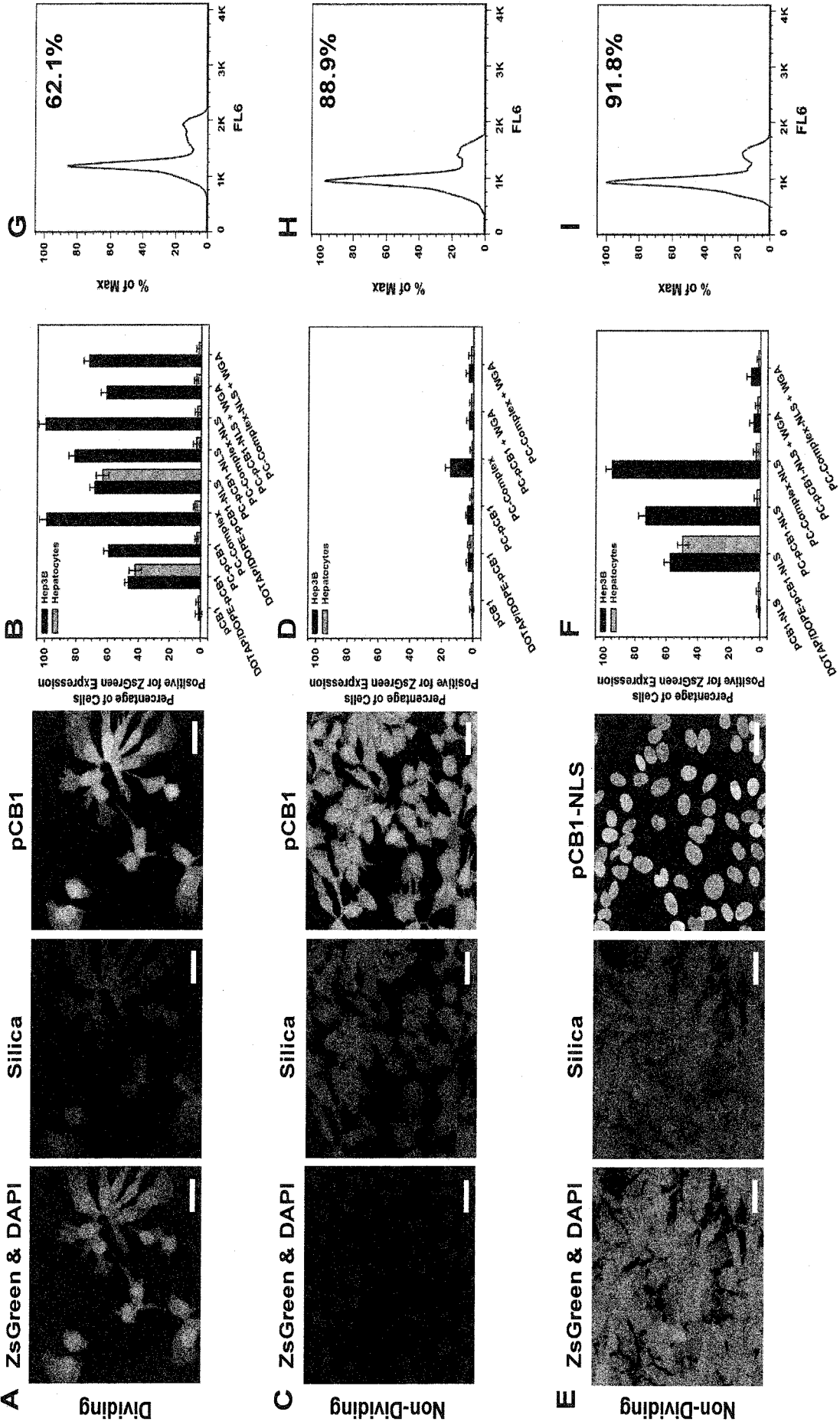


FIGURE 25

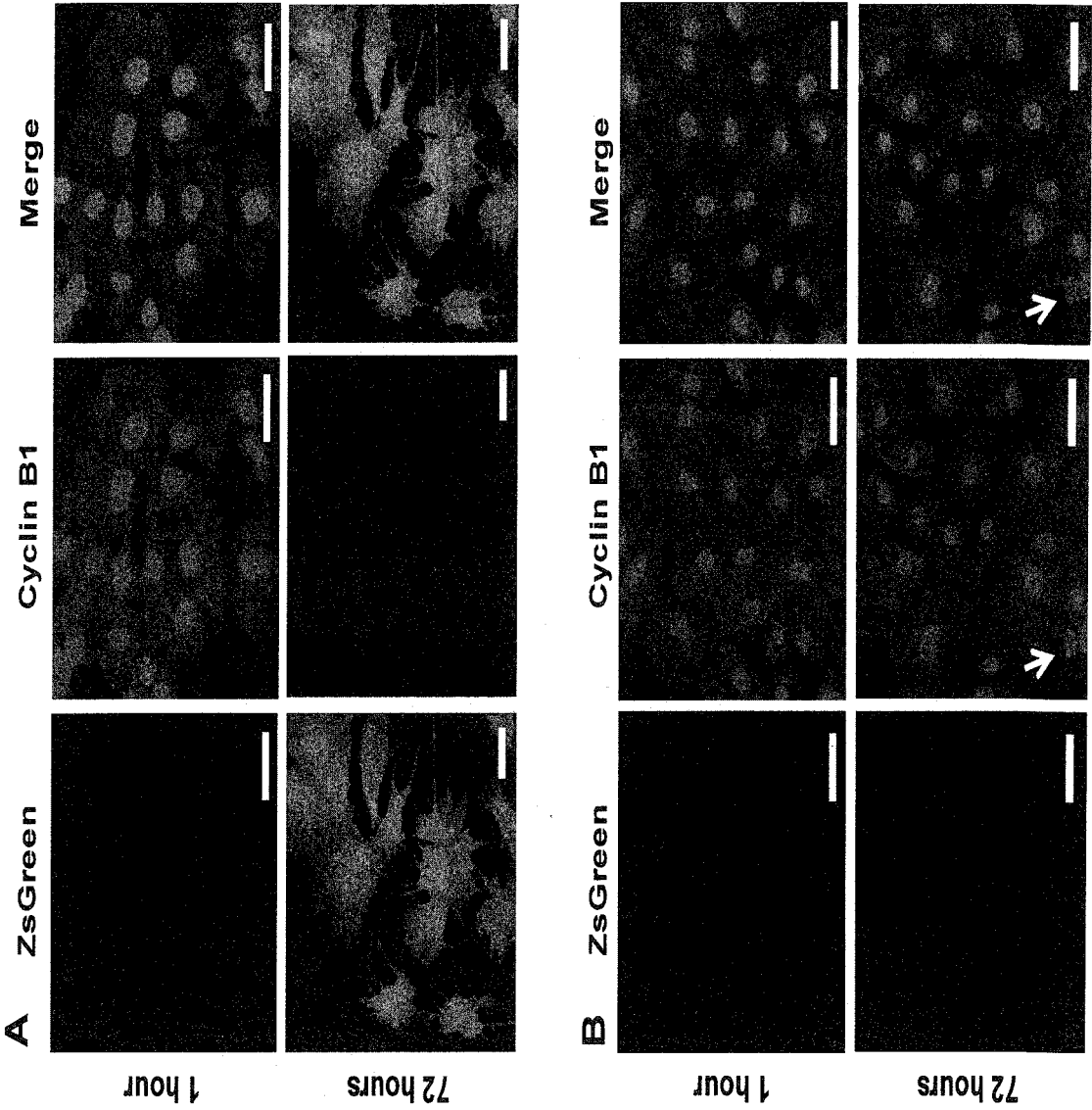


FIGURE 26

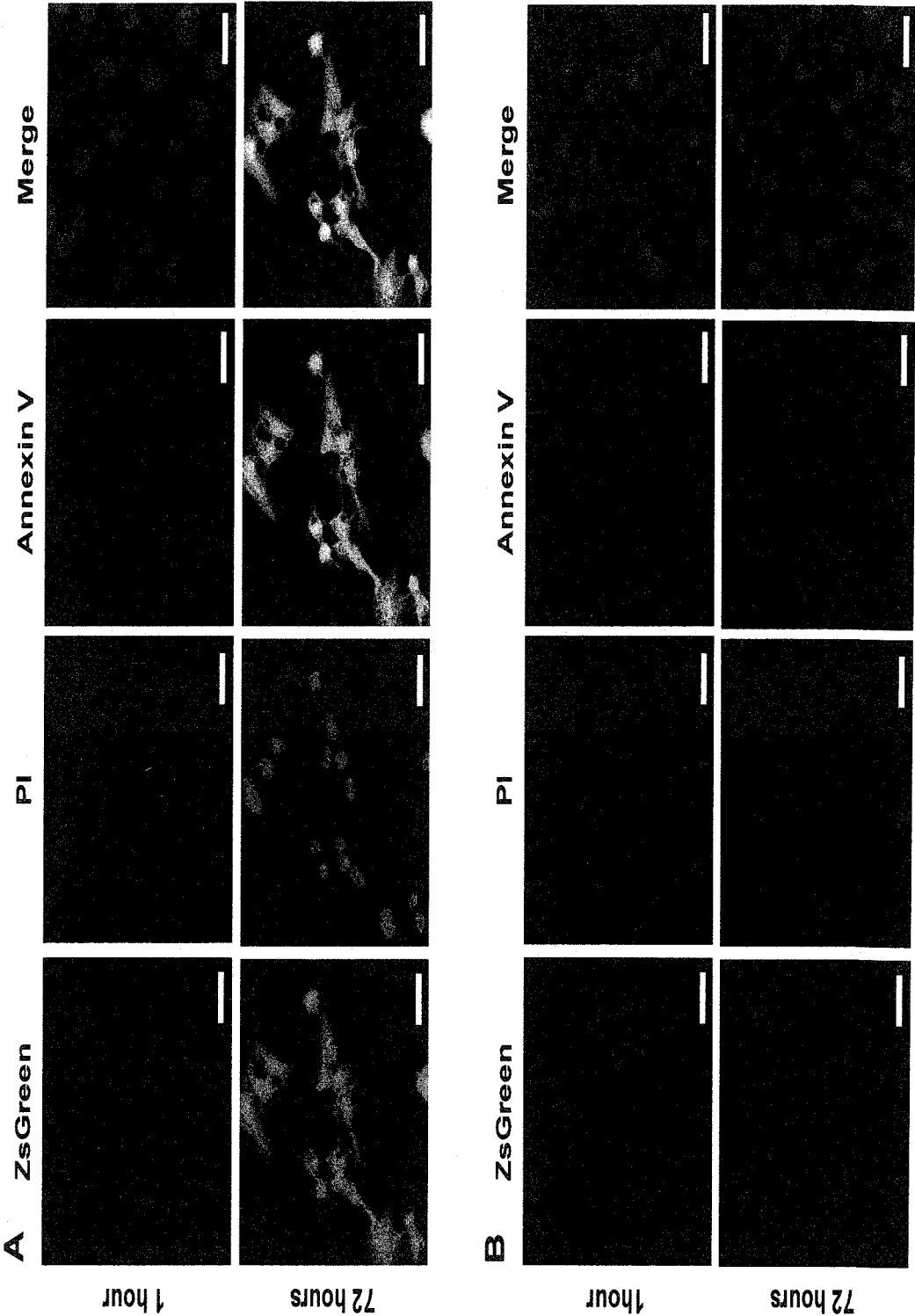


FIGURE 27

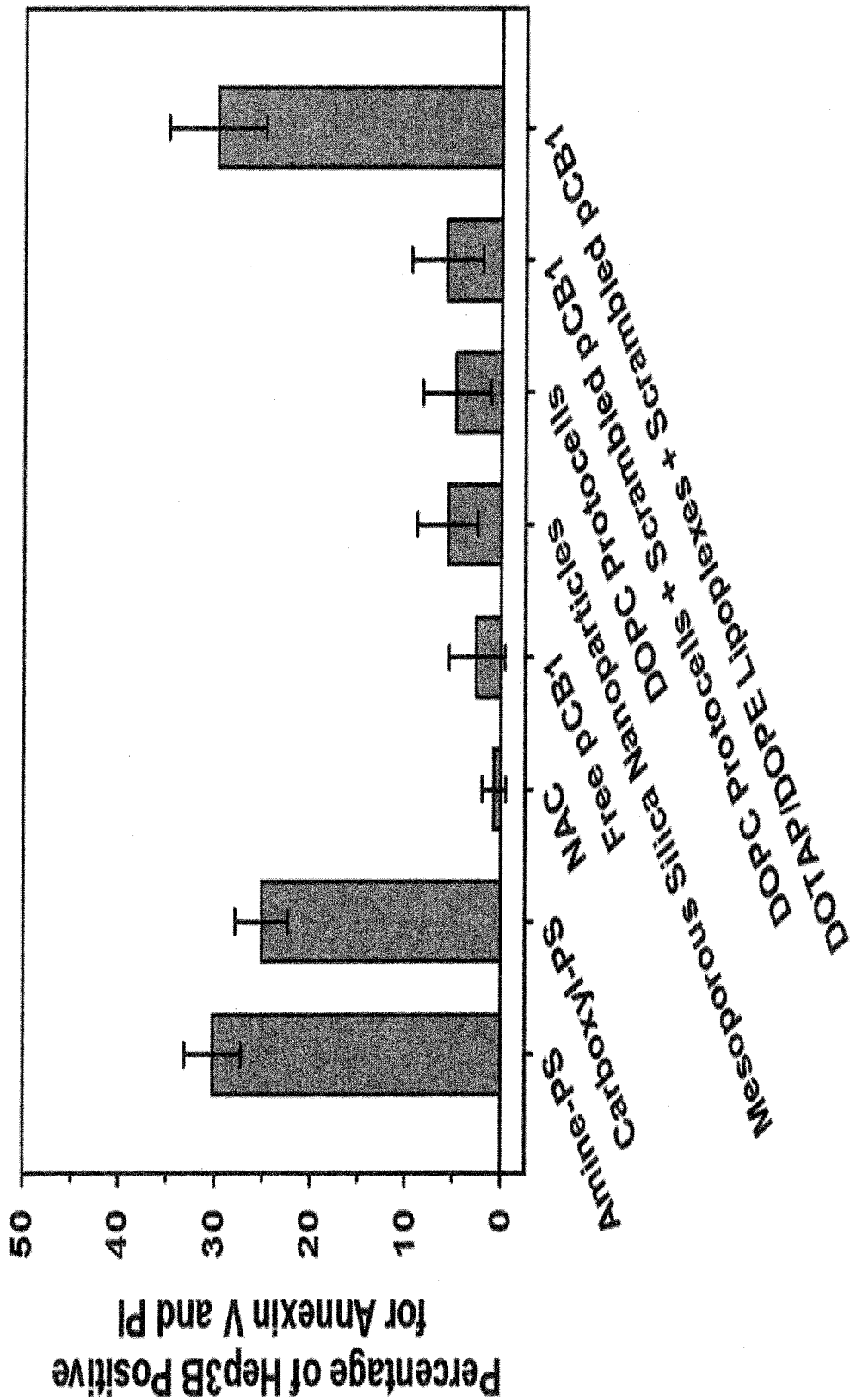


FIGURE 1X2

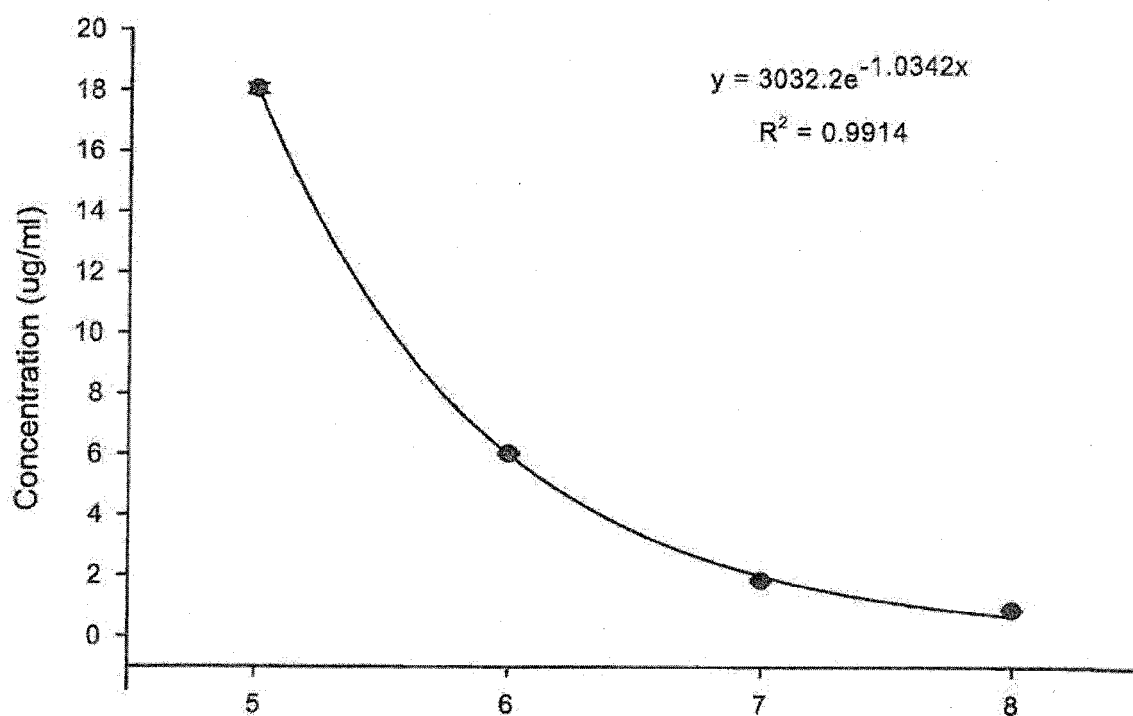


FIGURE 2X2

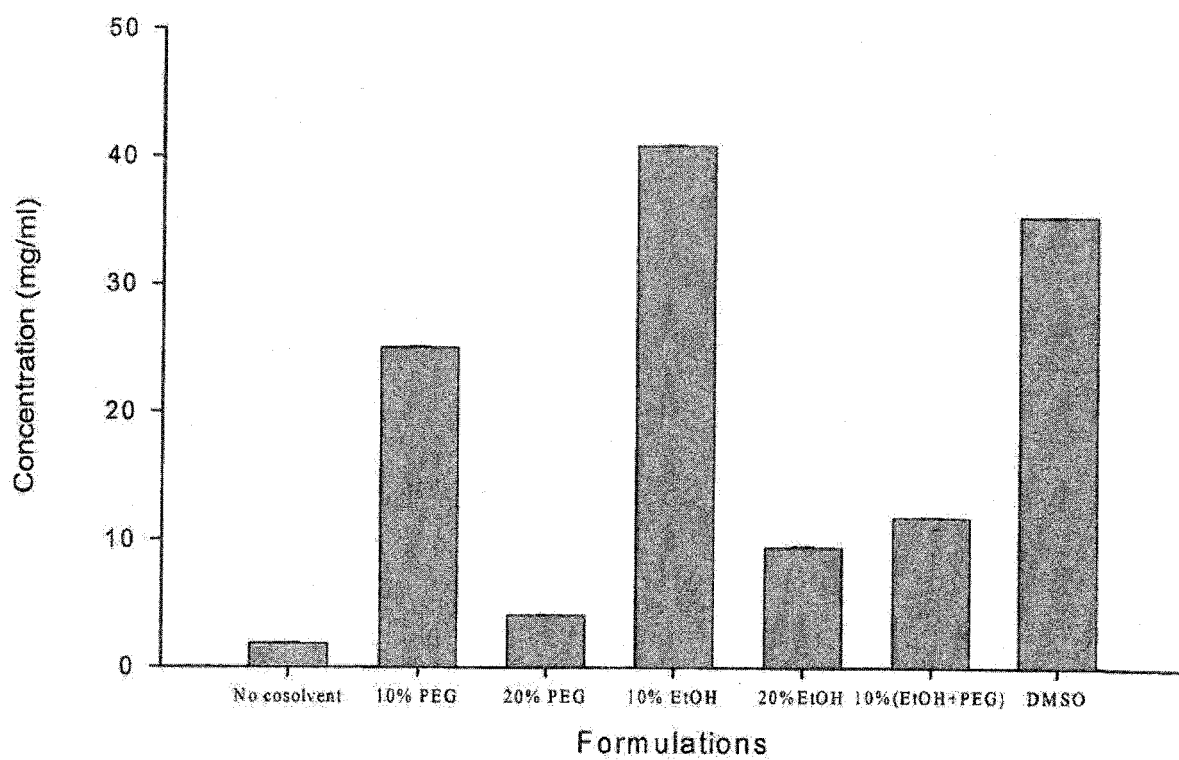


FIGURE 3X2

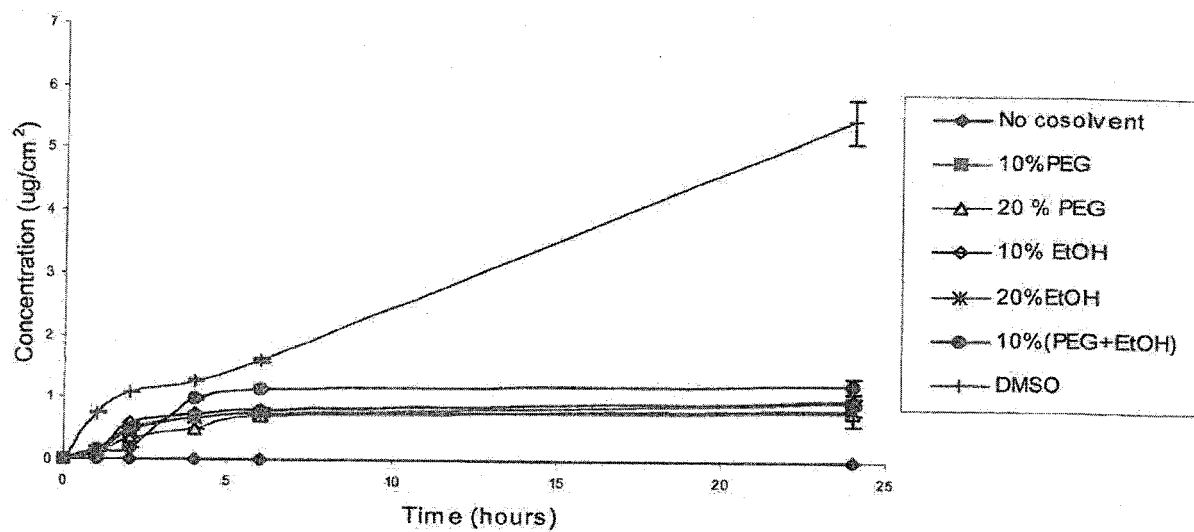


FIGURE 4X2

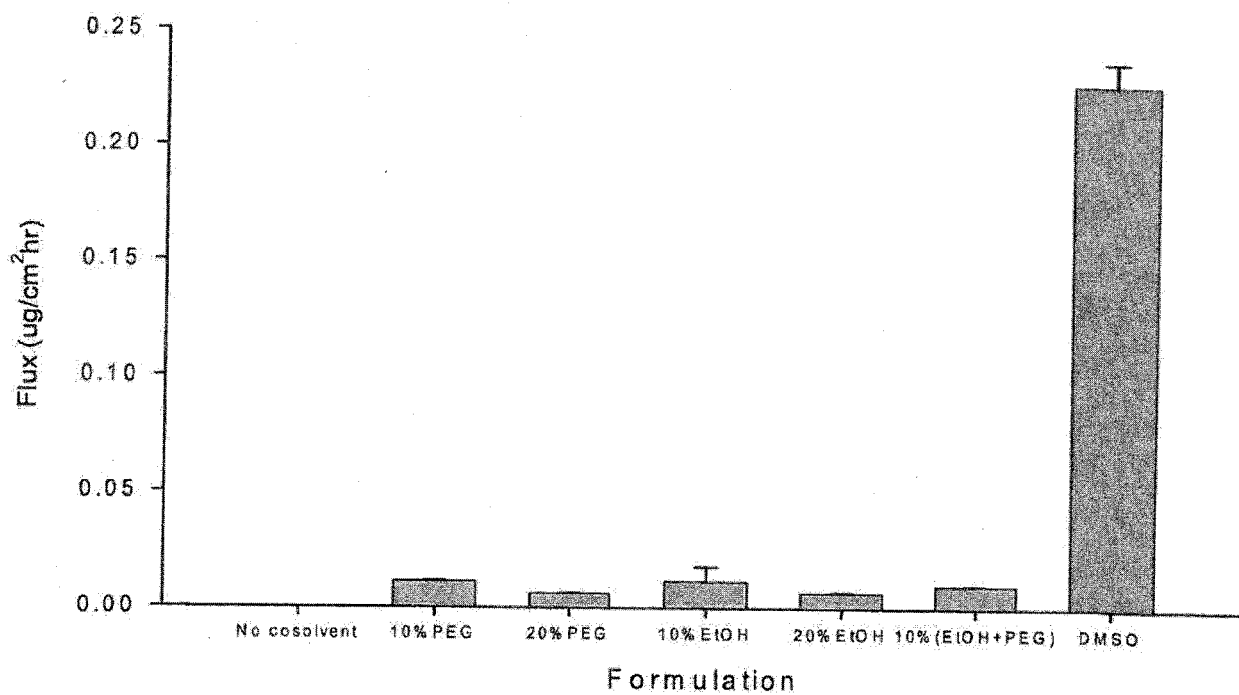


FIGURE 1X3

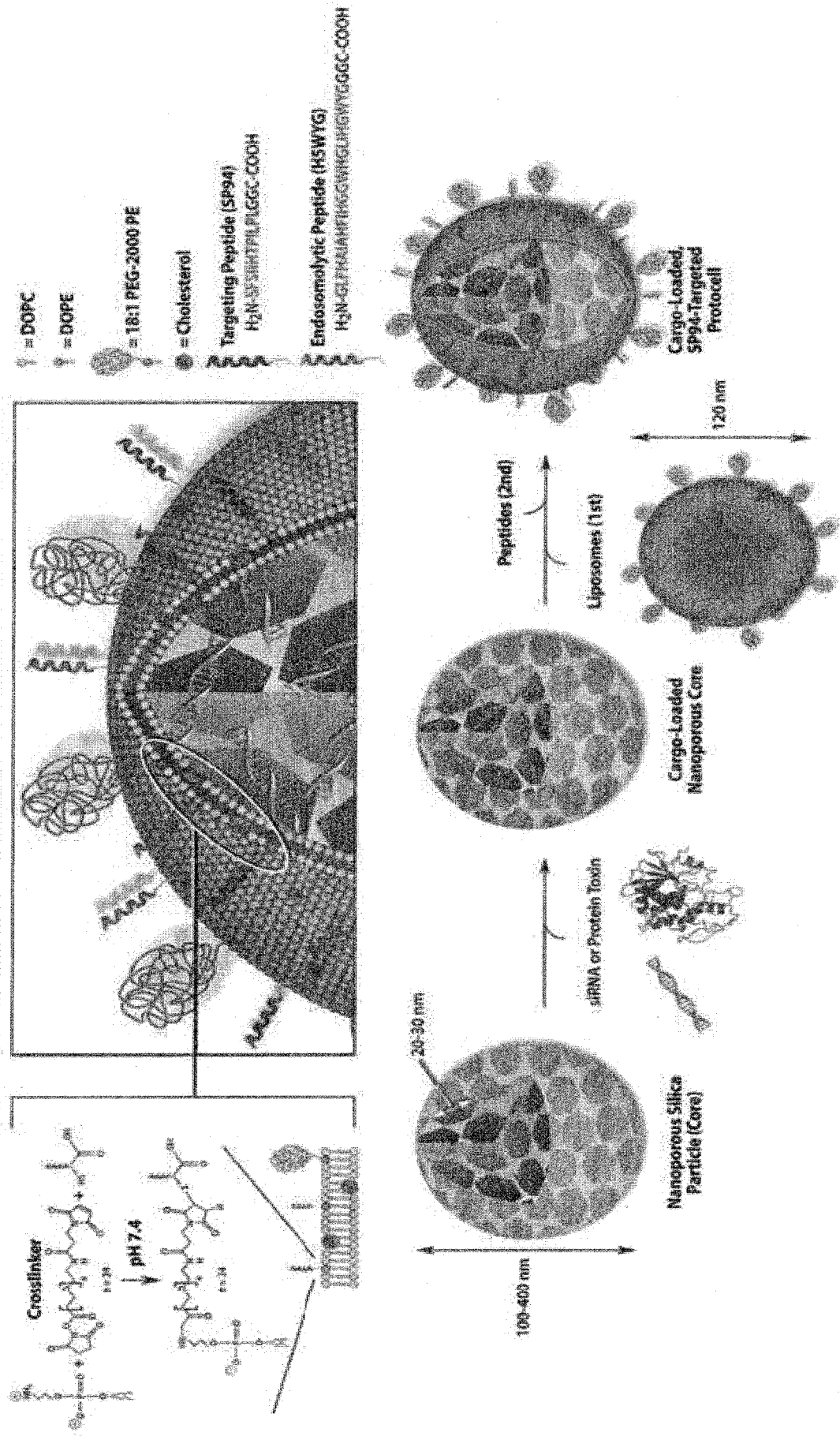


FIGURE 2X3

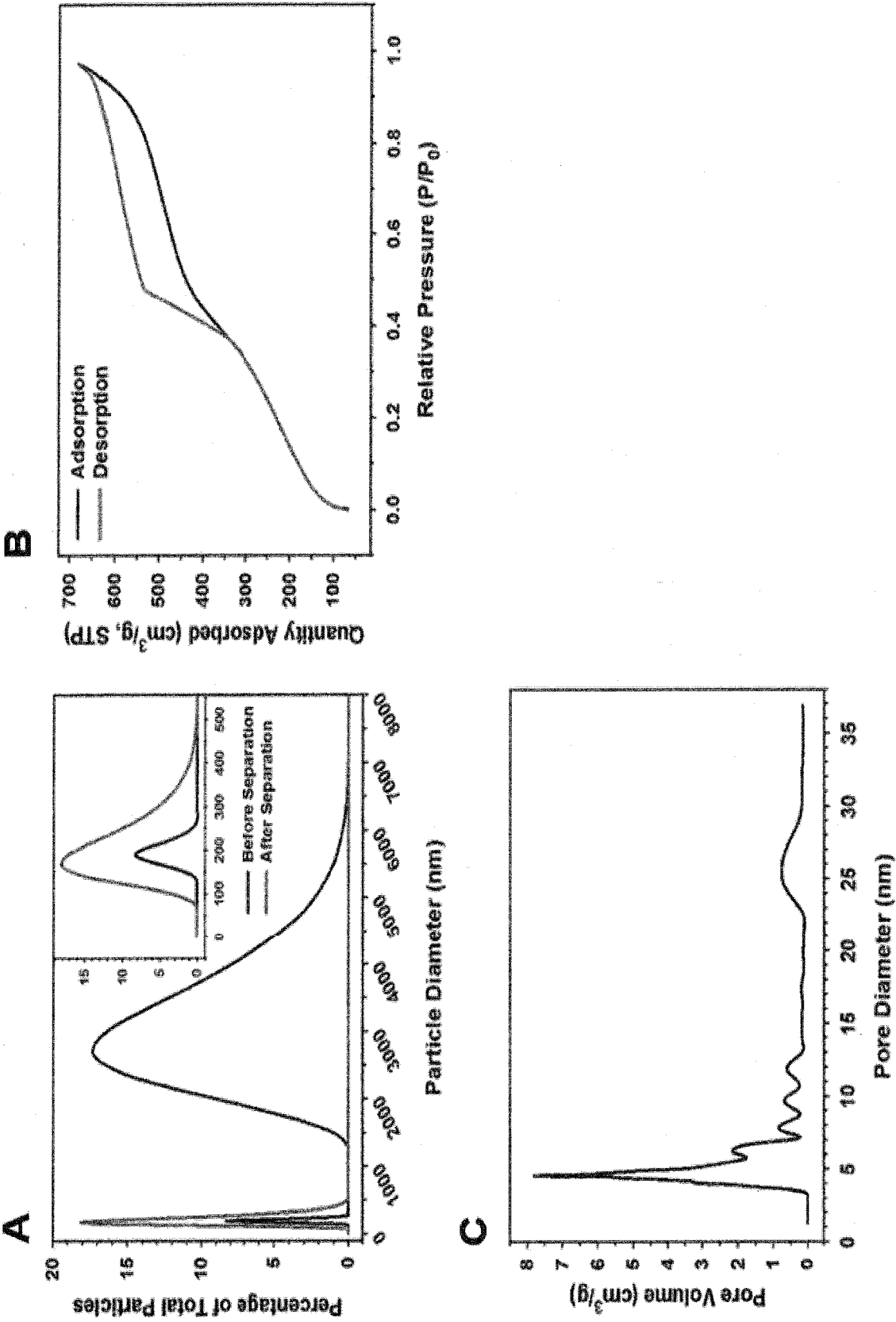


FIGURE 3X3

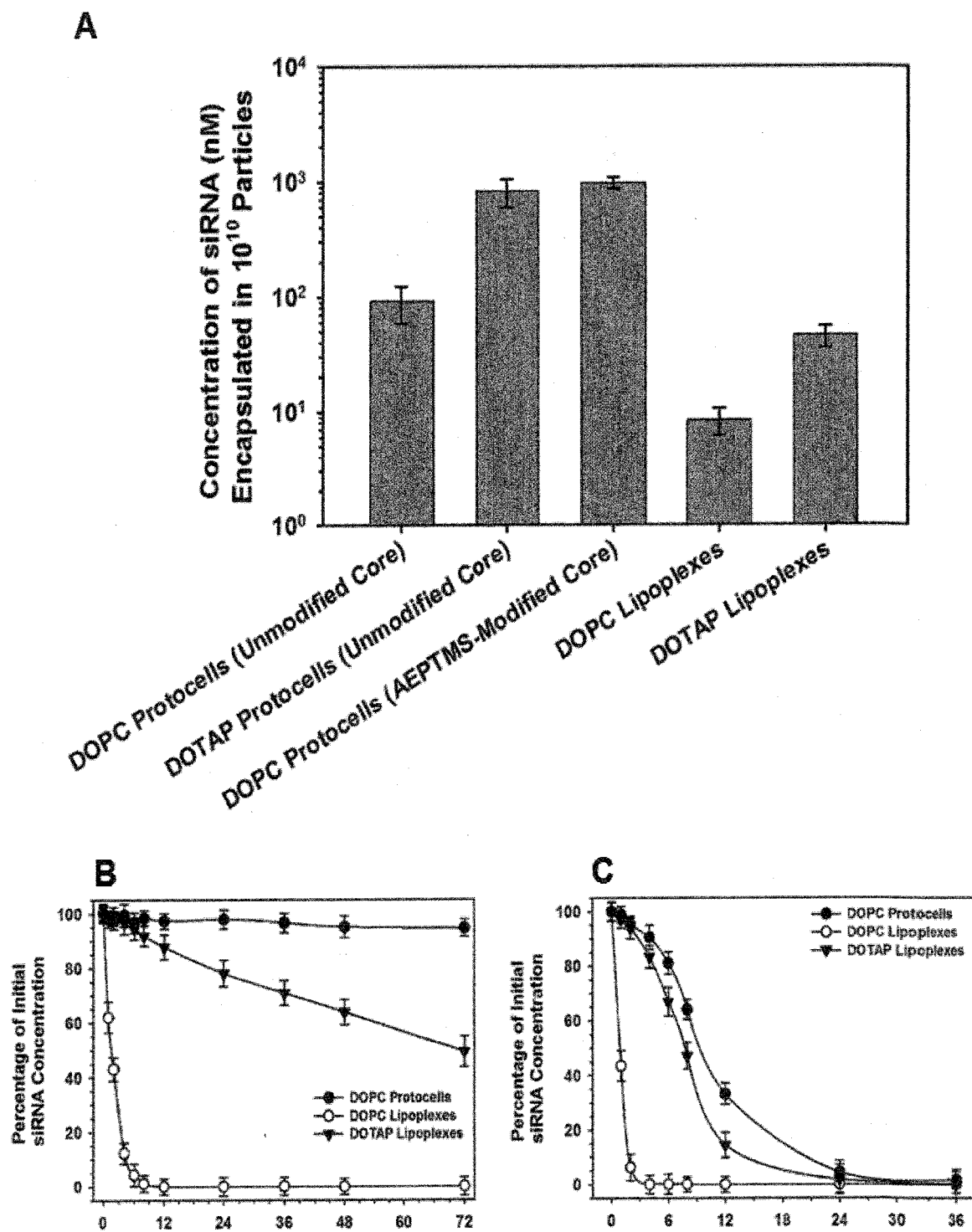


FIGURE 4X3

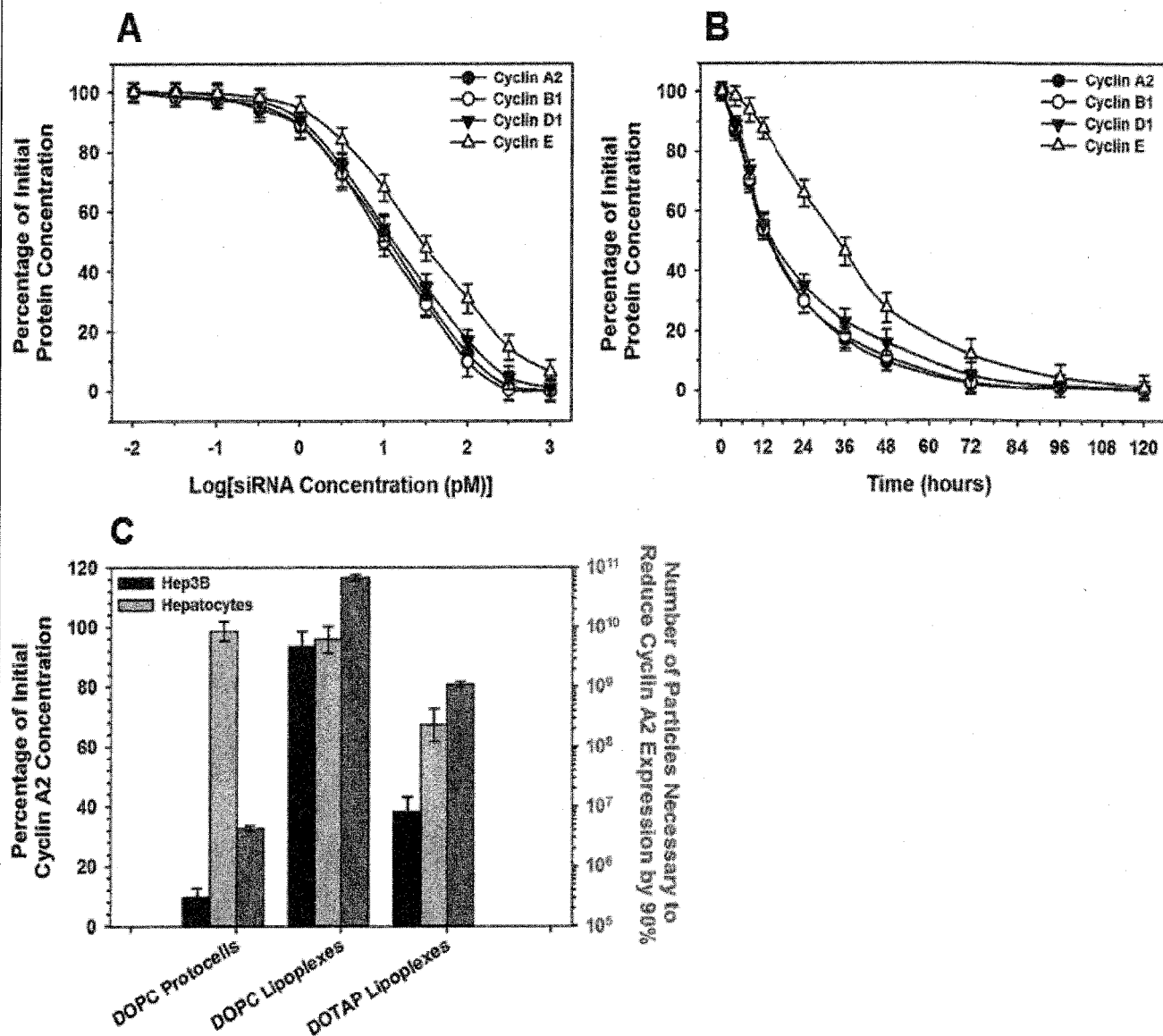


FIGURE 5X3

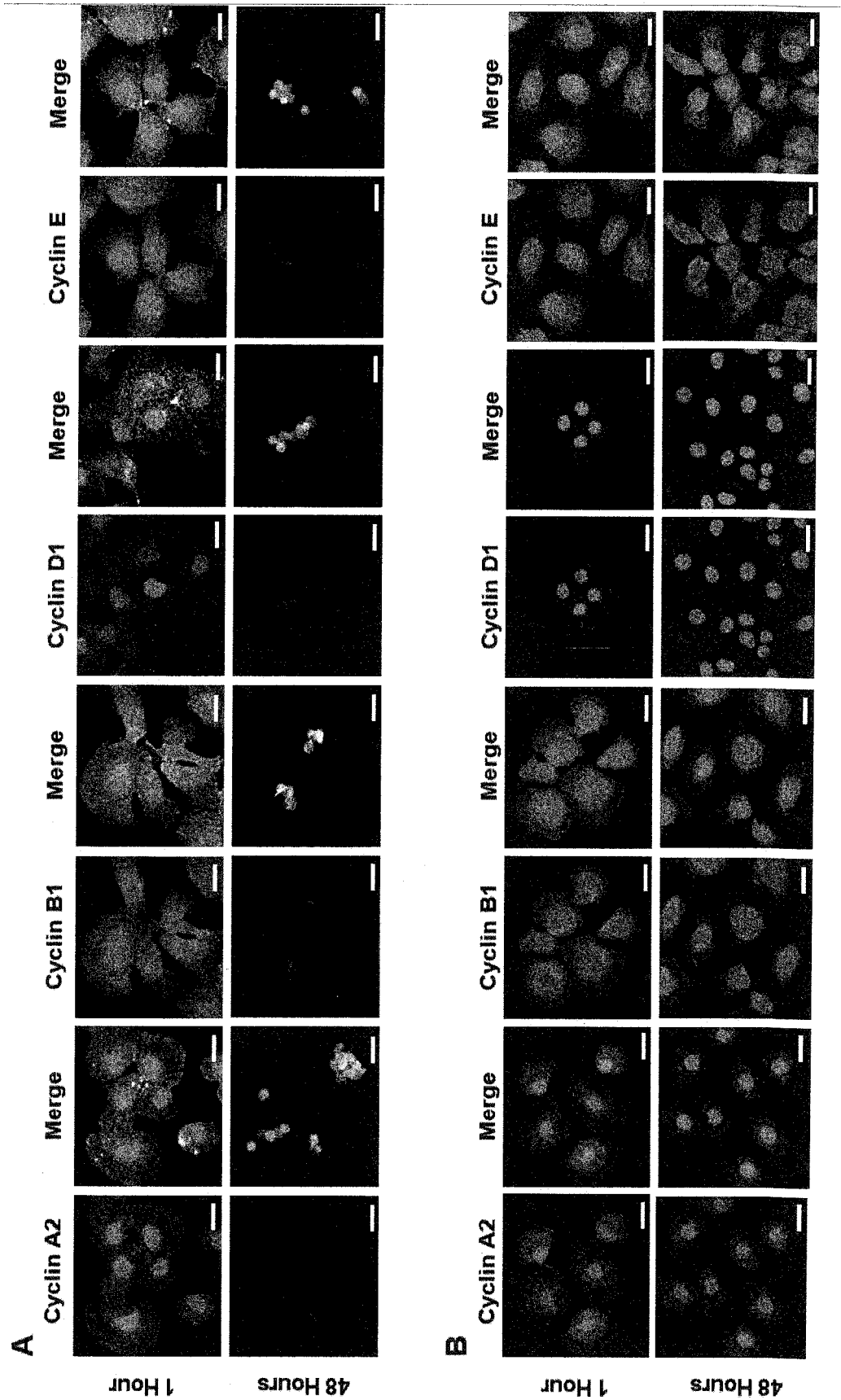


FIGURE 6X3

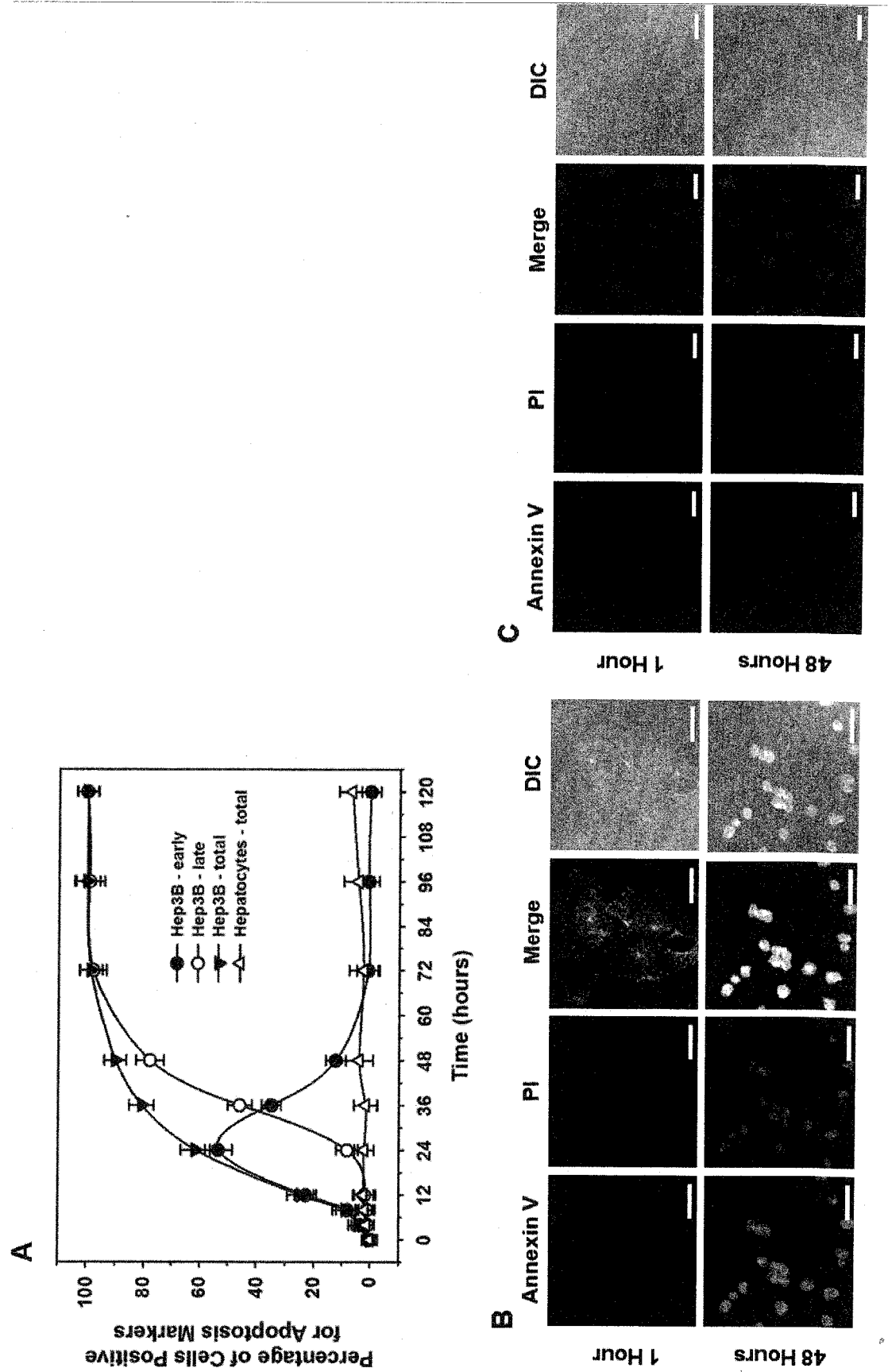


FIGURE 7X3

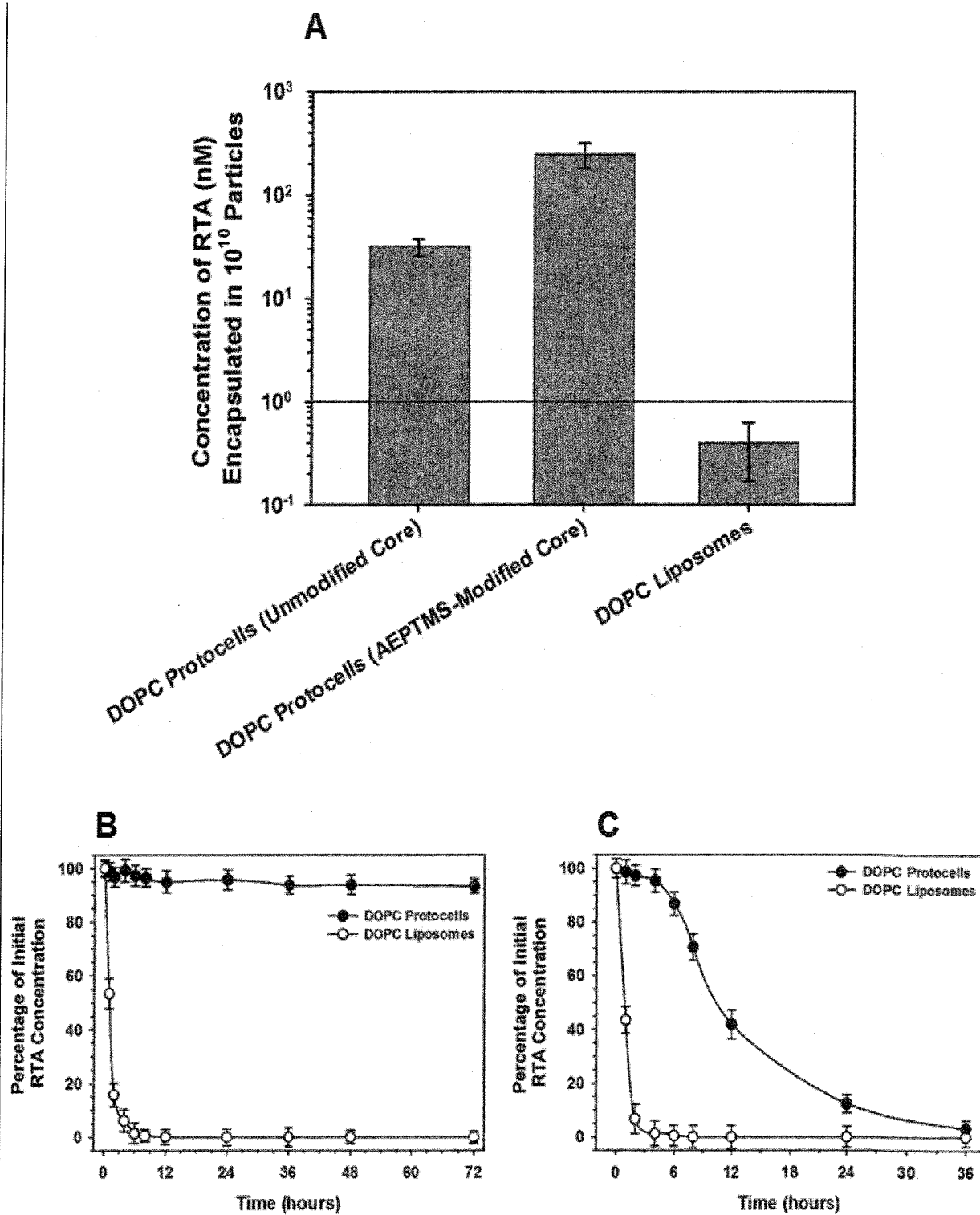


FIGURE 8X3

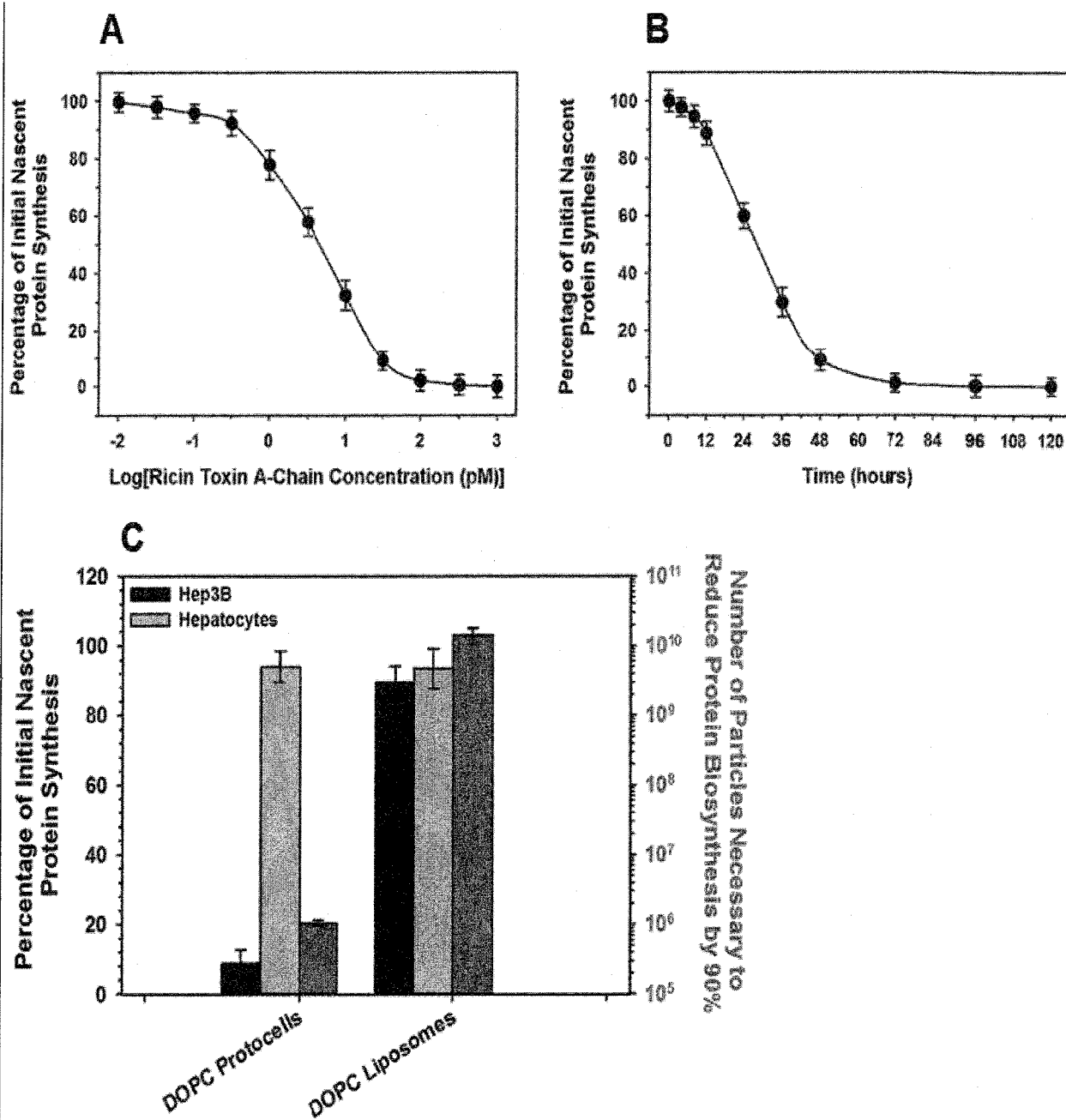


FIGURE 9X3

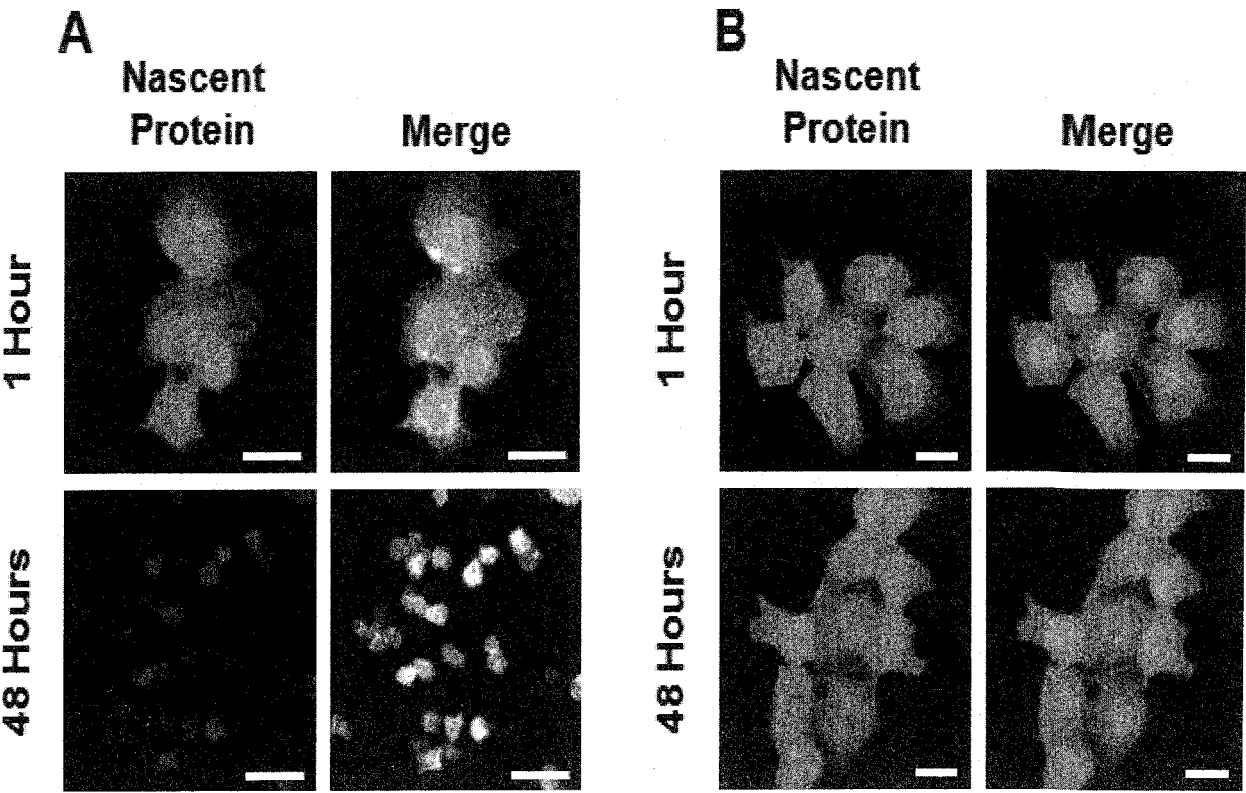


FIGURE 10X3

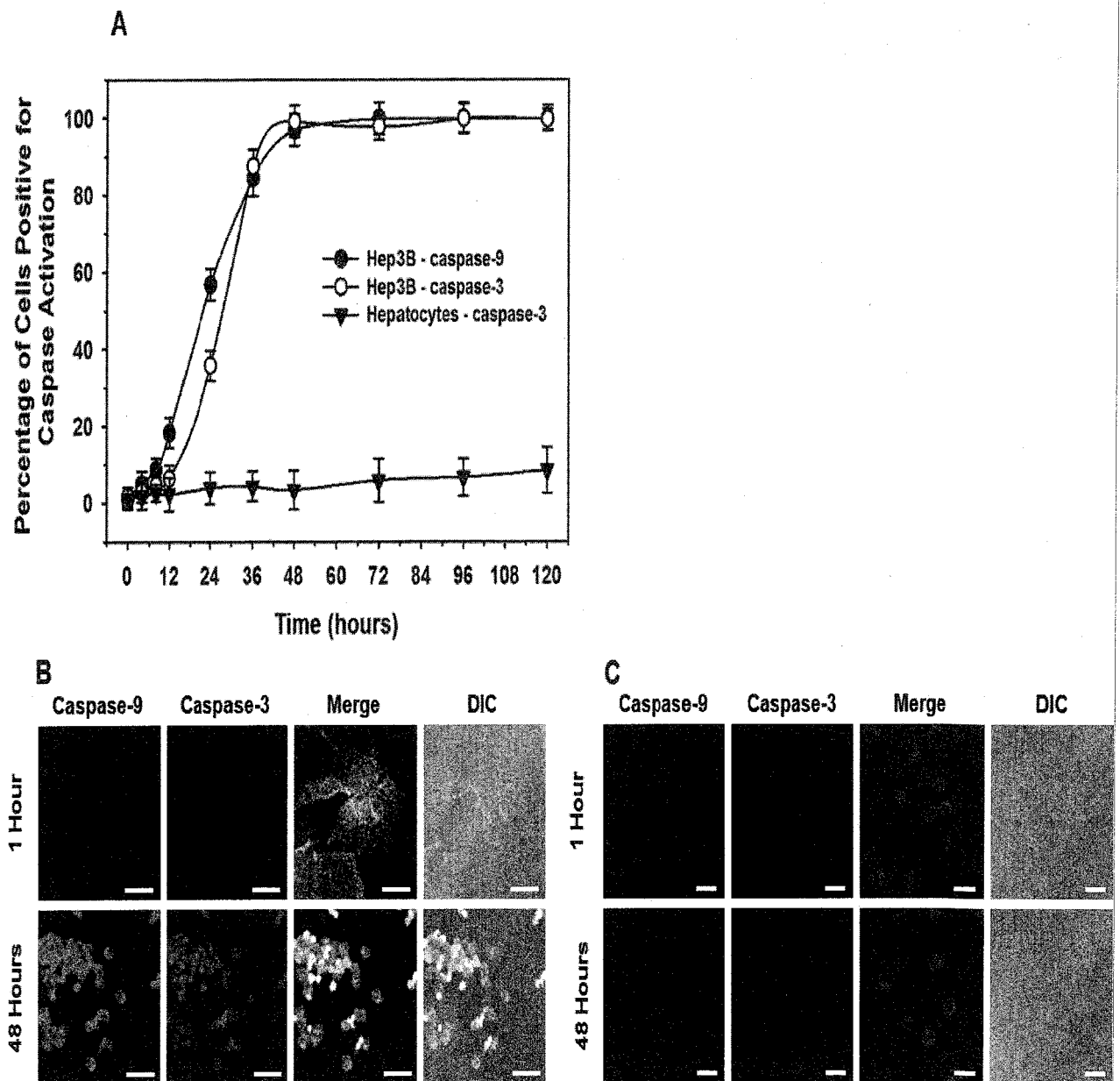


Figure 1X5

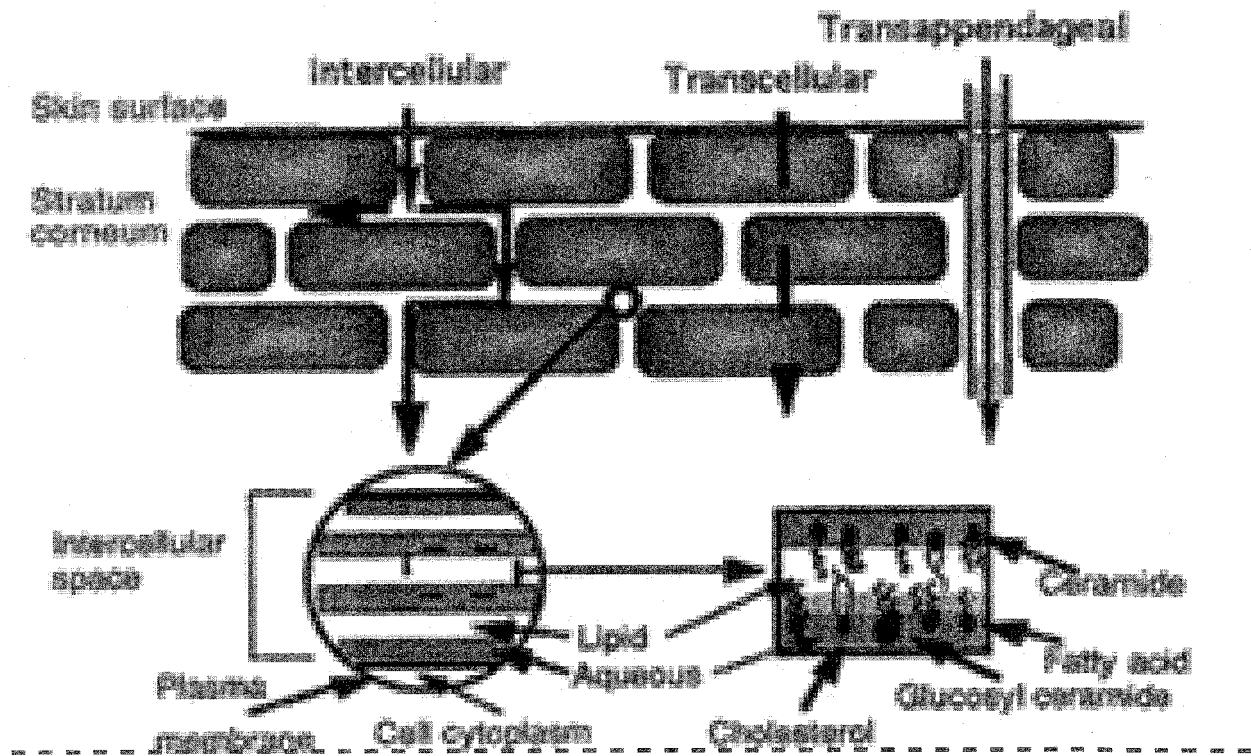


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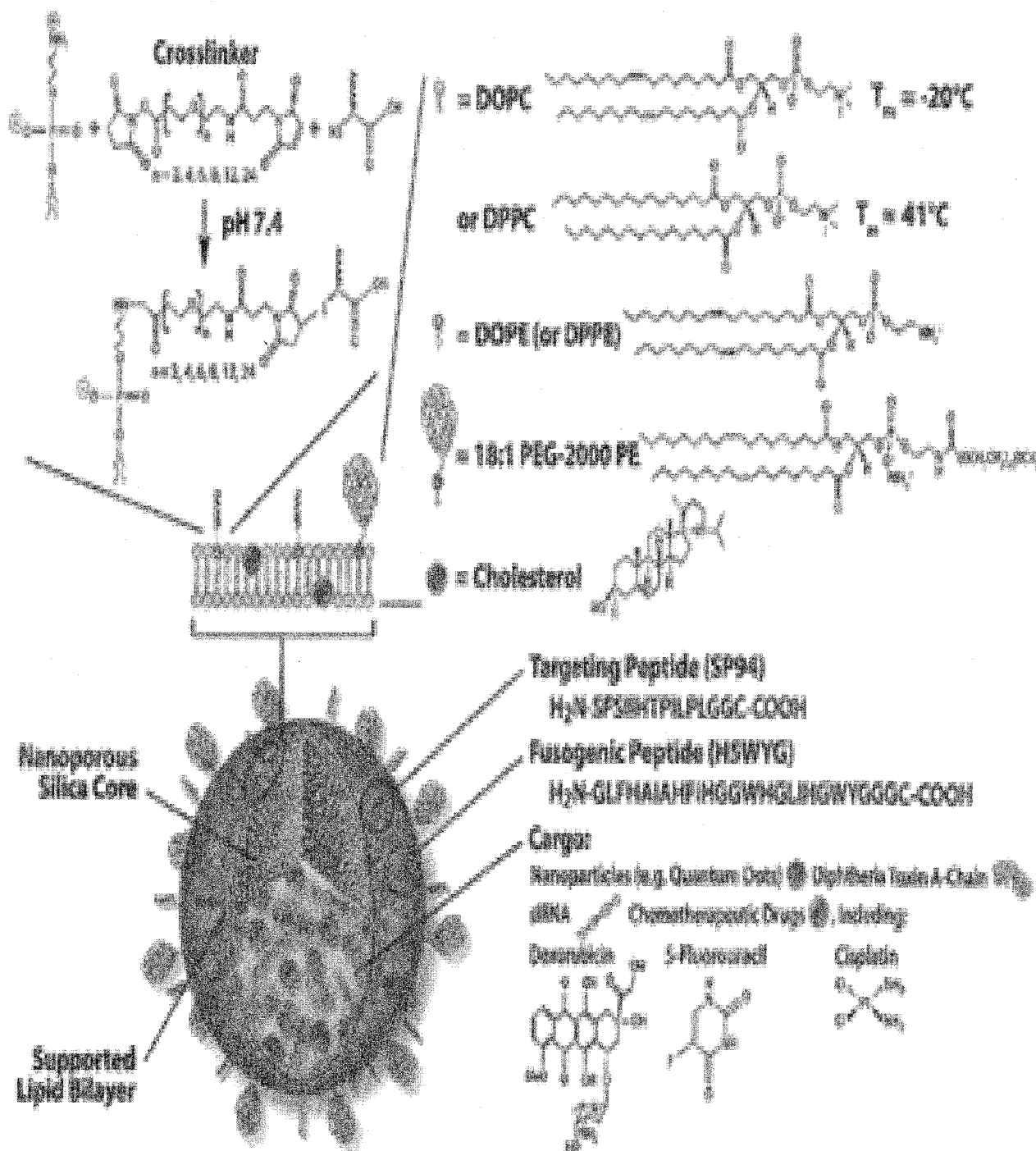


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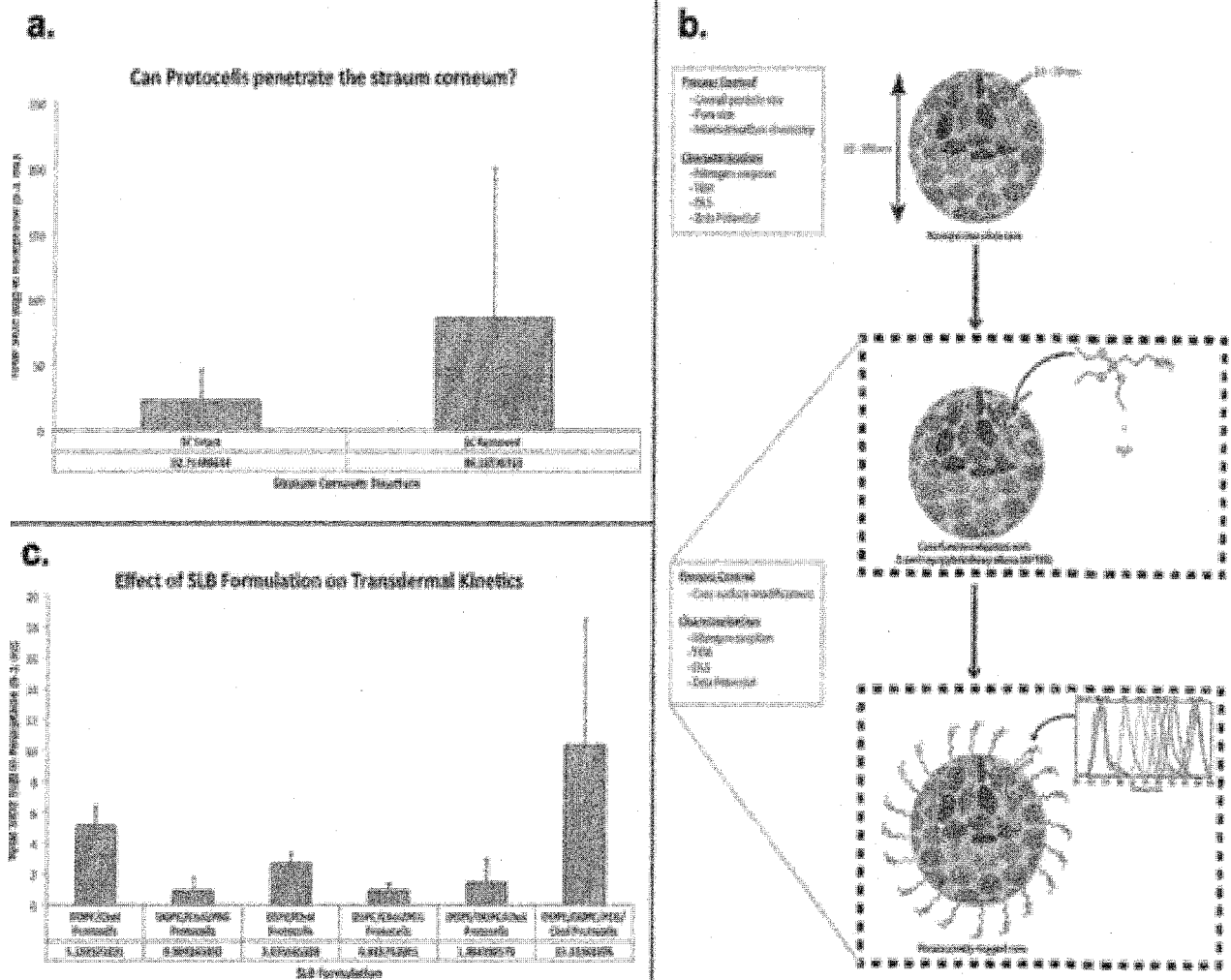


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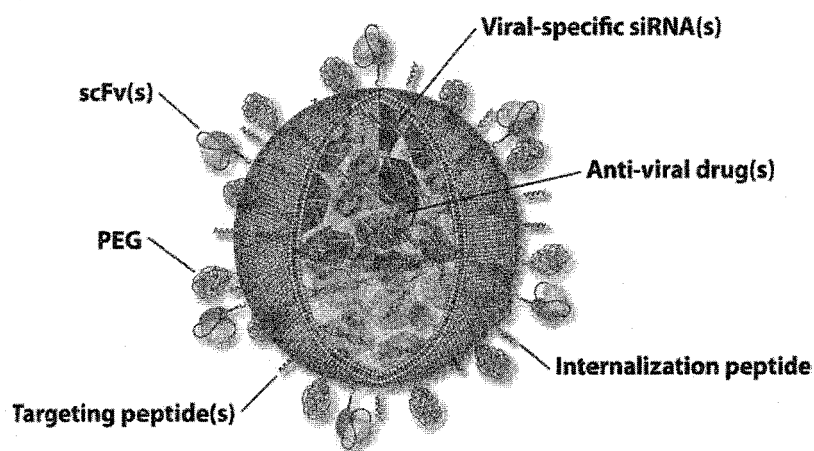


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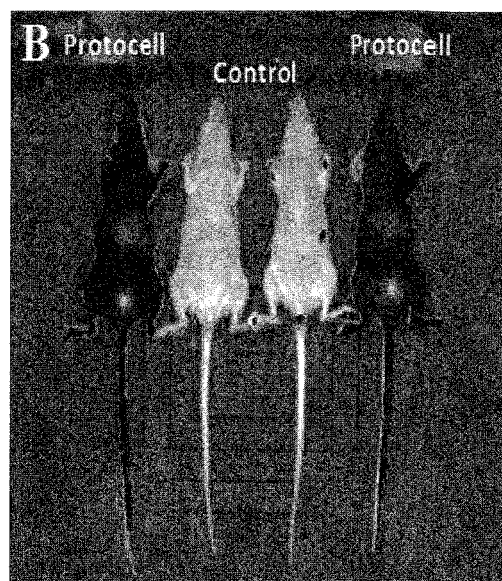
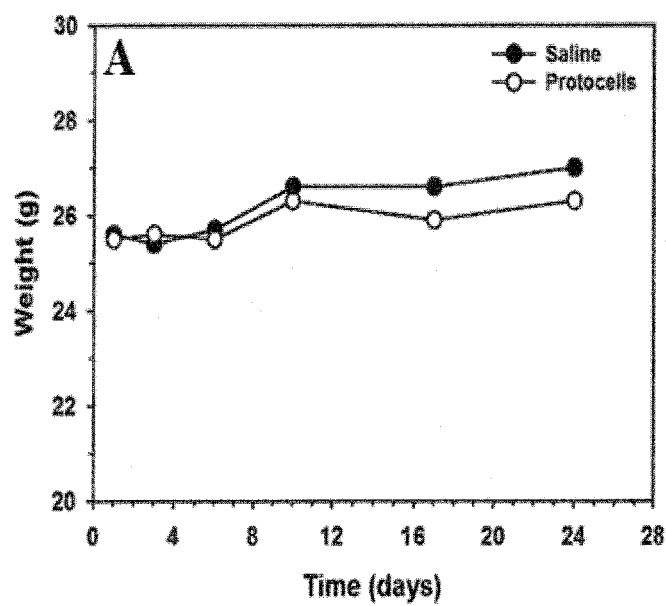


Figure 1X7

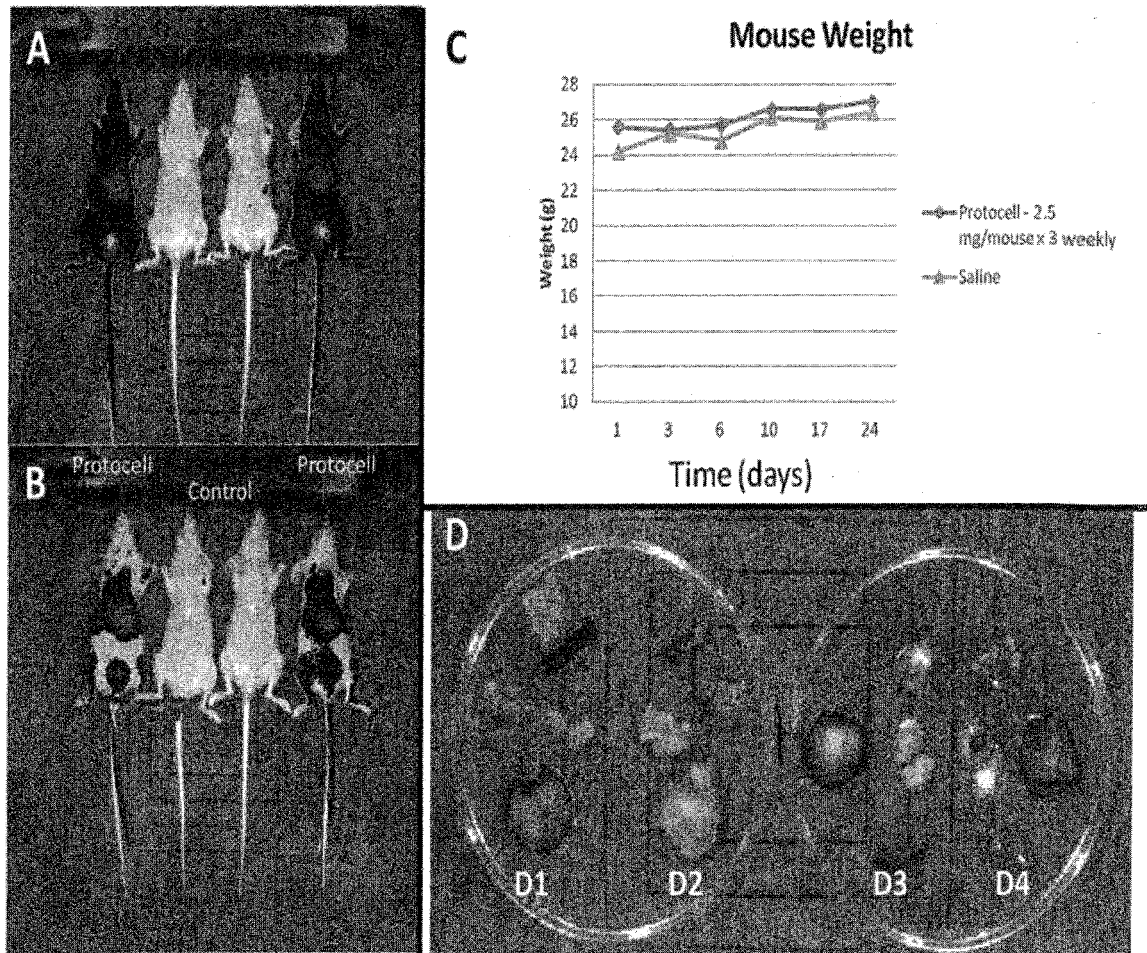


Figure 2X7



Figure 1X8

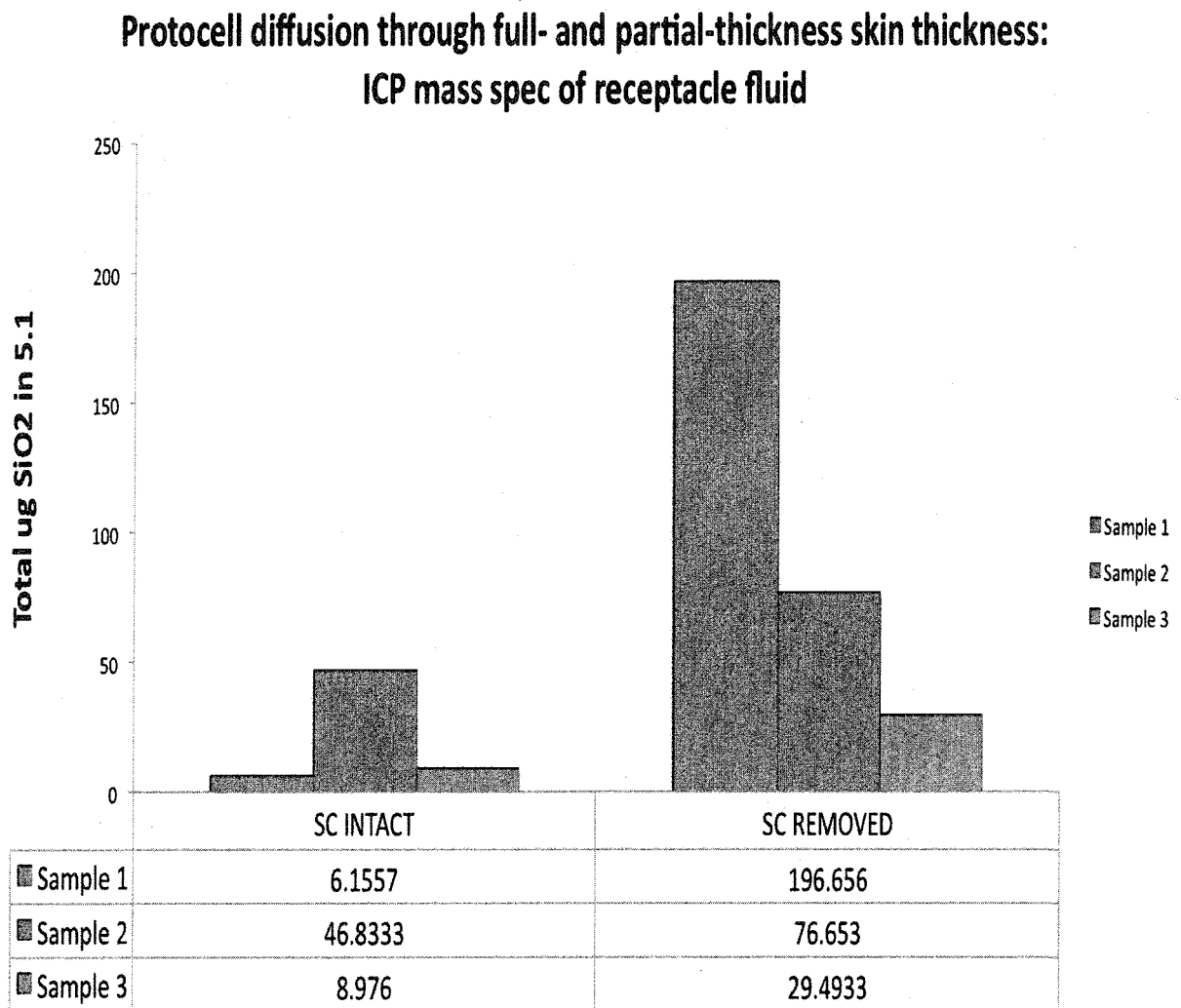


Figure 2X8

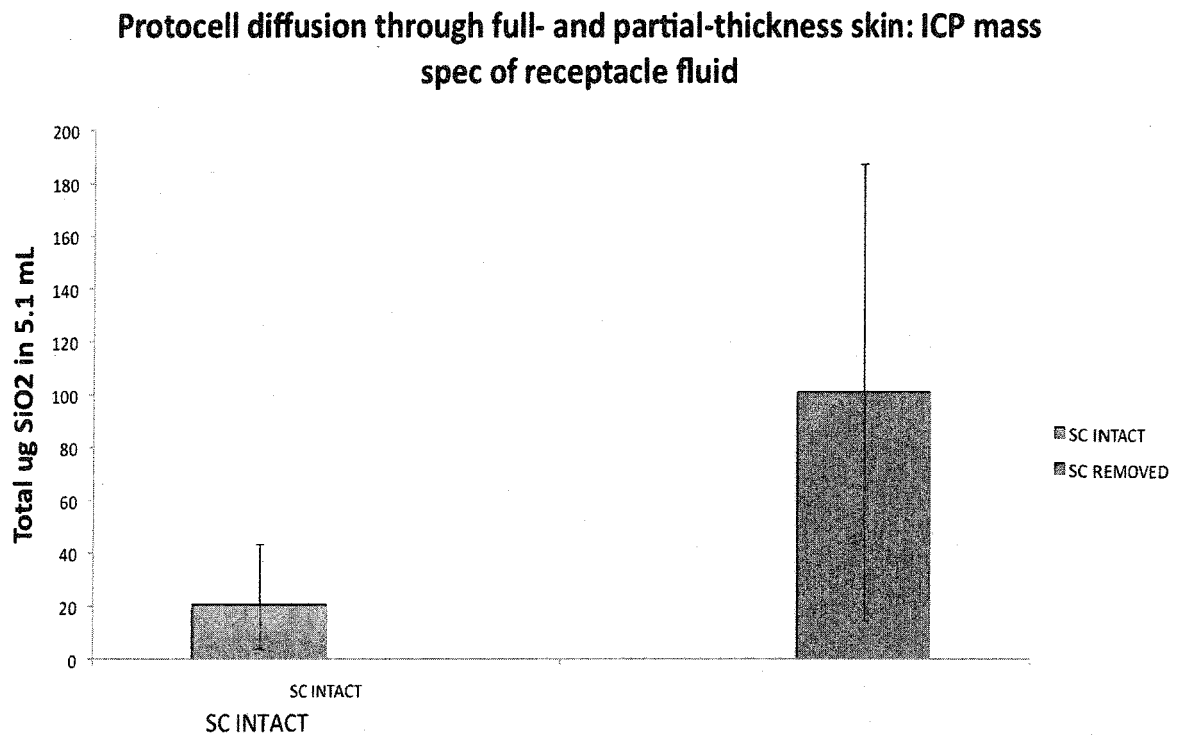


Figure 3X8

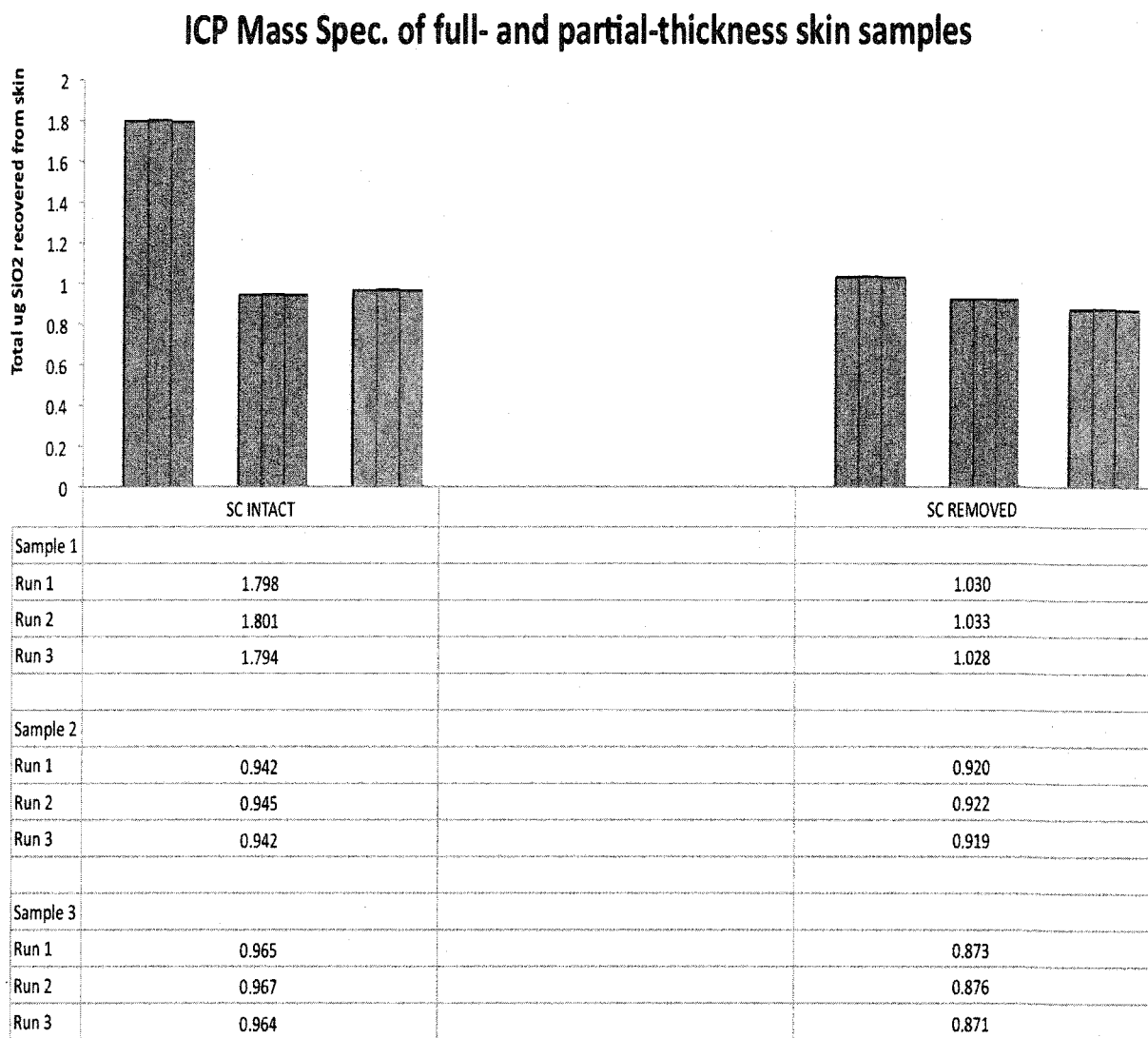


Figure 4X8

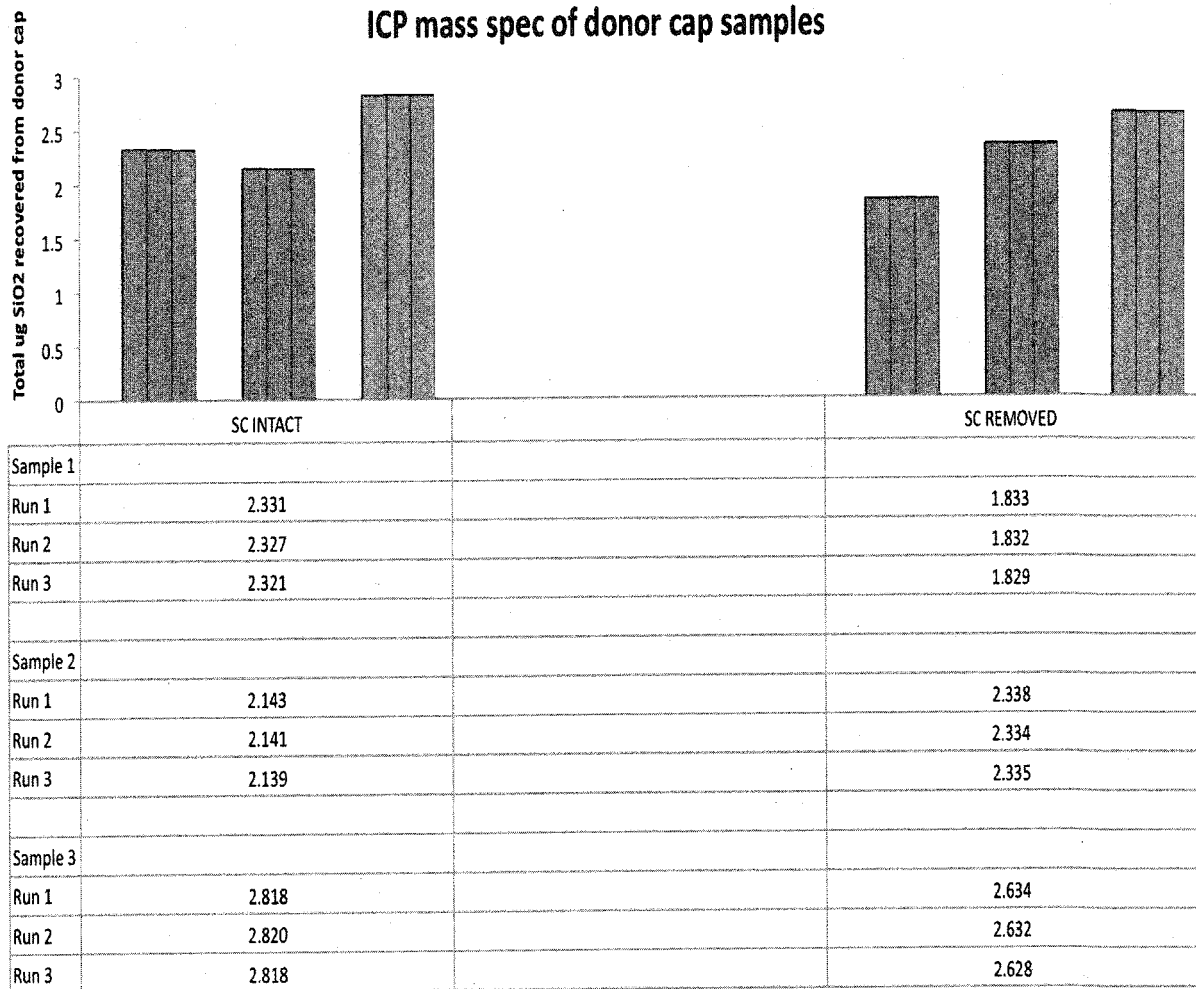
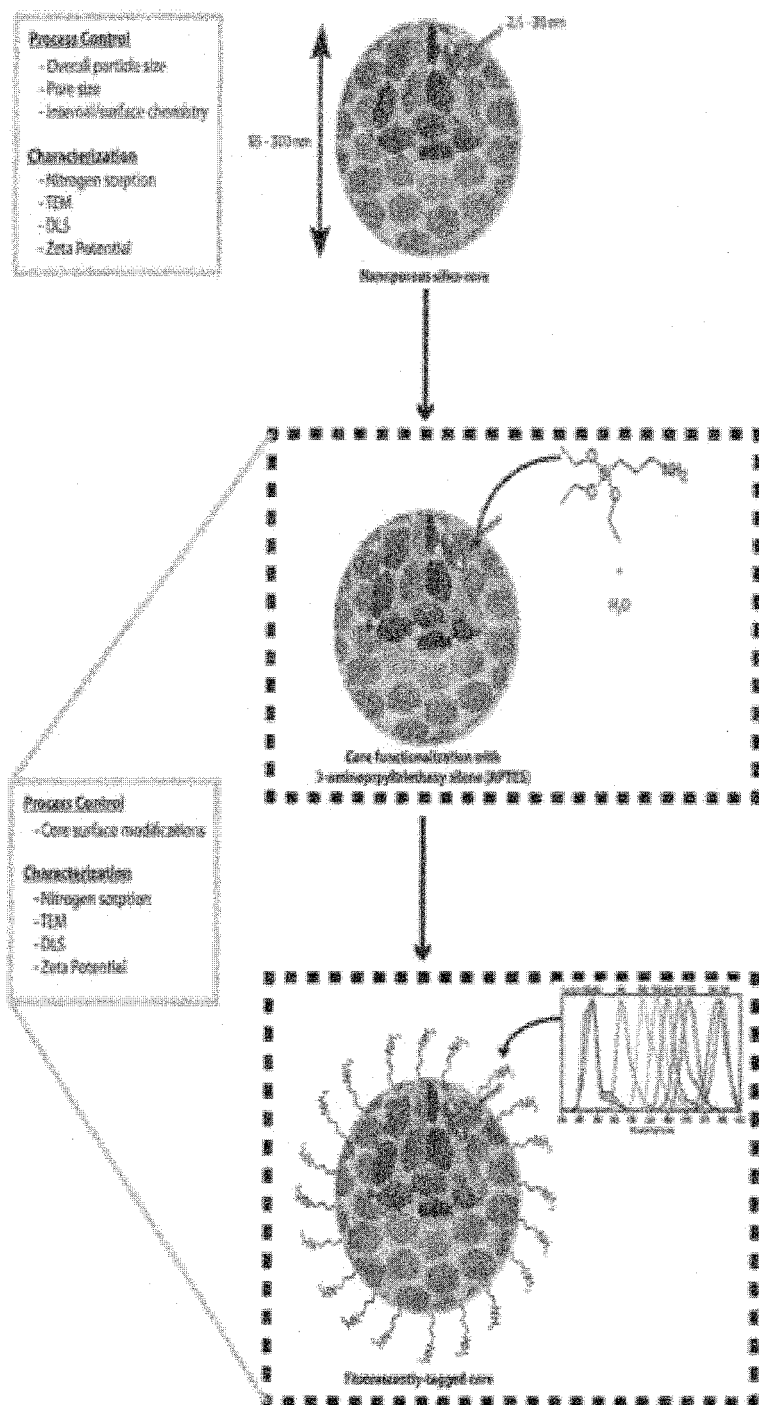


Figure 5X8

Core Functionalization



Dry SiO₂ is suspended in 200 μ l ethanol at a concentration of 1 mg/ml and briefly bath ultrasonicated to ensure that everything is in solution.

If the Protocol cores need to be functionalized (i.e. imaging purposes), they are resuspended at a concentration of 0.5 mg/ml APTES, along with DI H₂O in a molar ratio of 89.25:8.9:14.0:0.14 (SiO₂:APTES:H₂O). This is allow to react for 6 hours, then the SiO₂ is centrifuged at 5000 $\times$ g for 4 min. This is washed 3X and resuspended in a concentration of 1 mg/ml in 200 proof ethanol. At this point the fluorescent tag is added at a ratio of 10 μ g dye to 1 mg SiO₂.

Figure 6X8

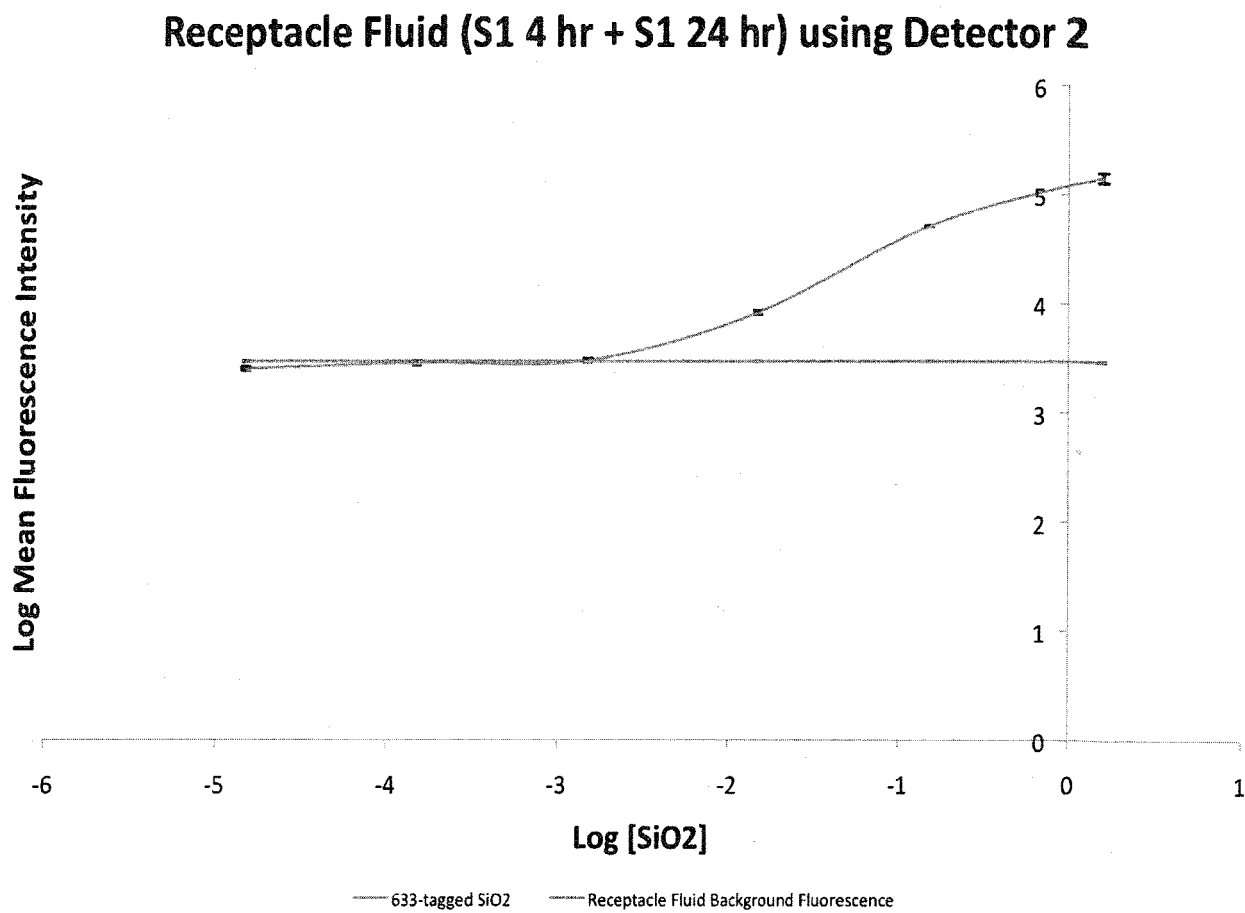


Figure 7X8

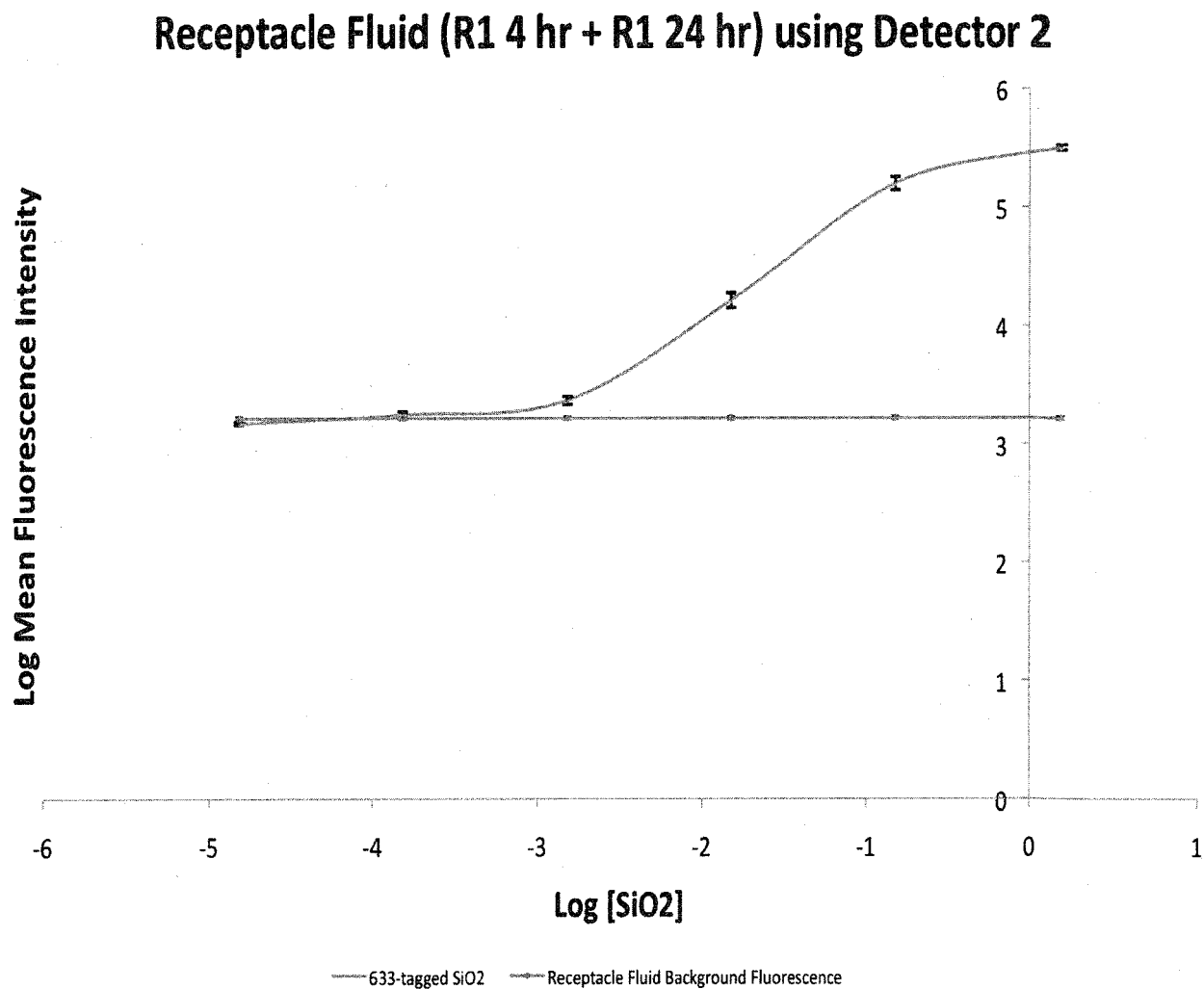


Figure 8X8

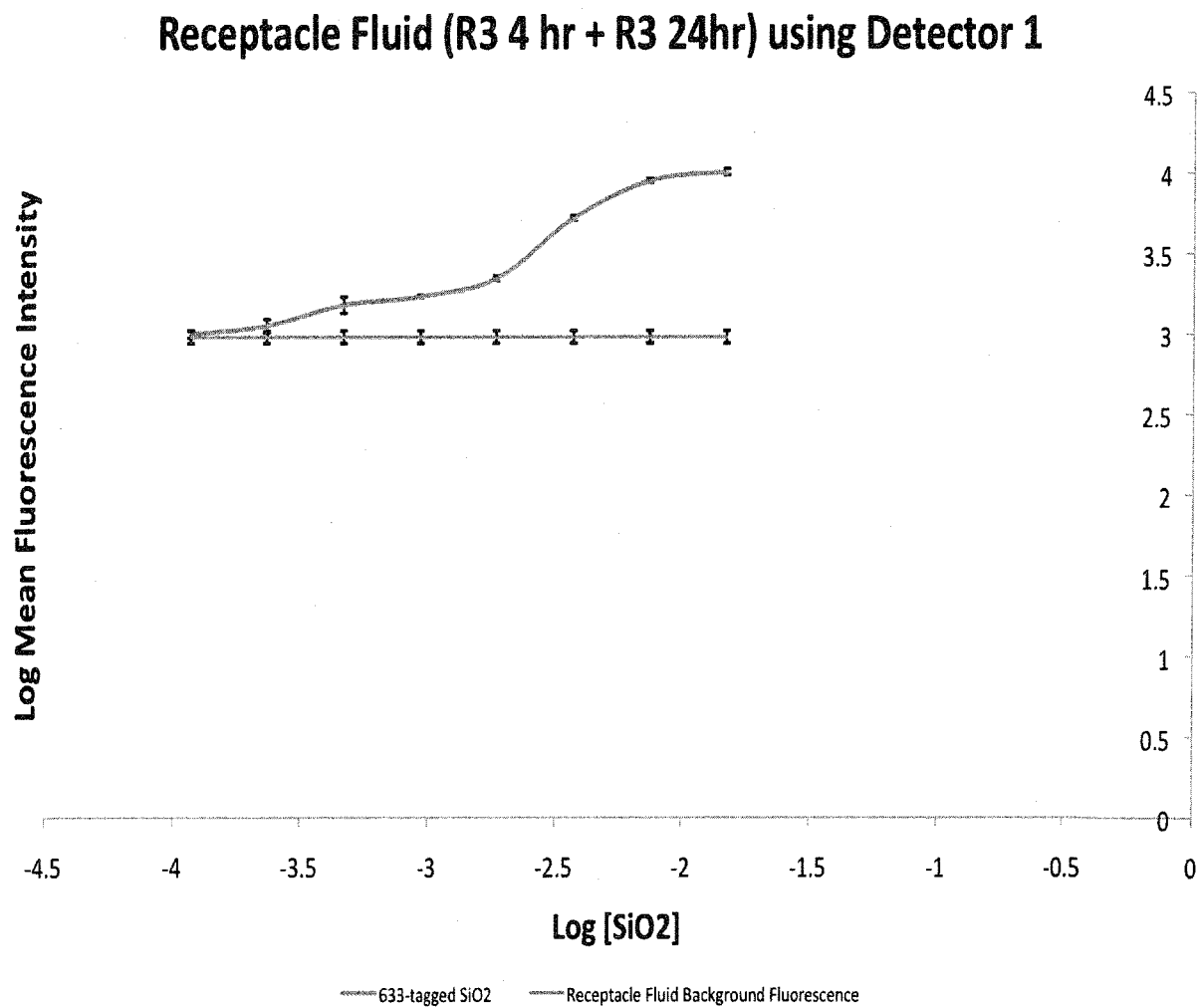


Figure 9X8

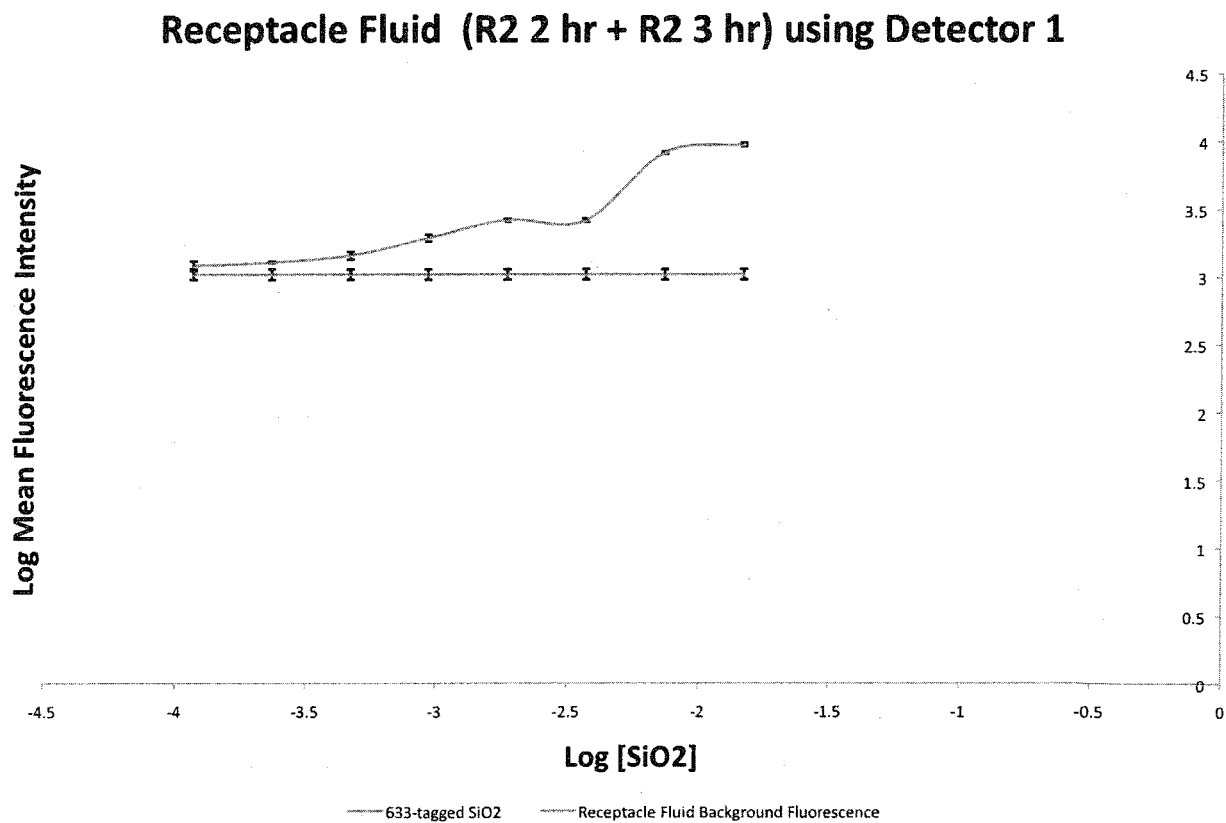


Figure 10X8

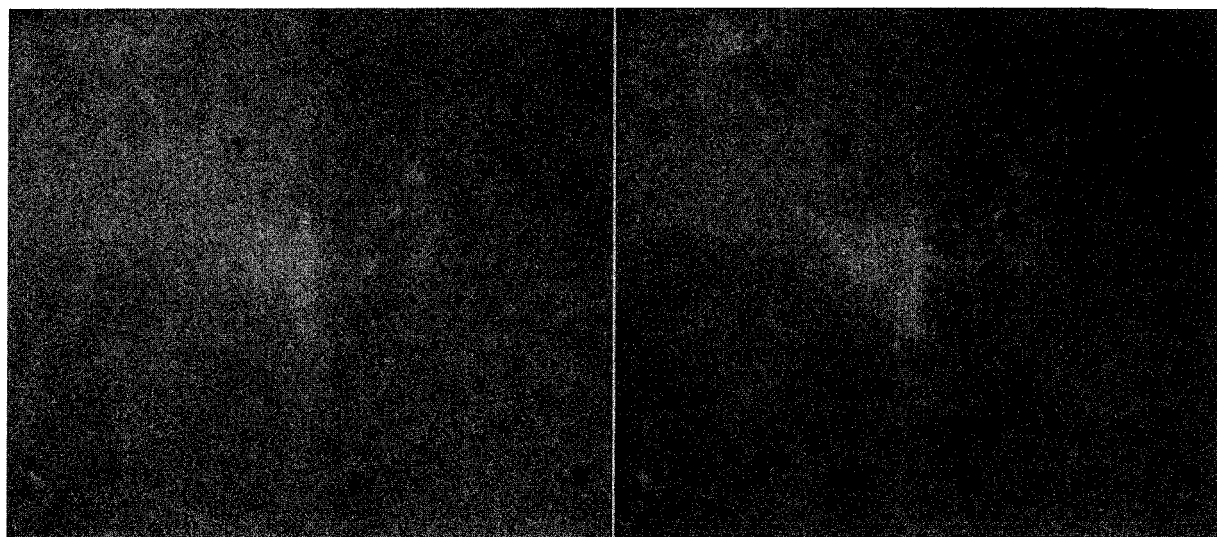


Figure 1X9

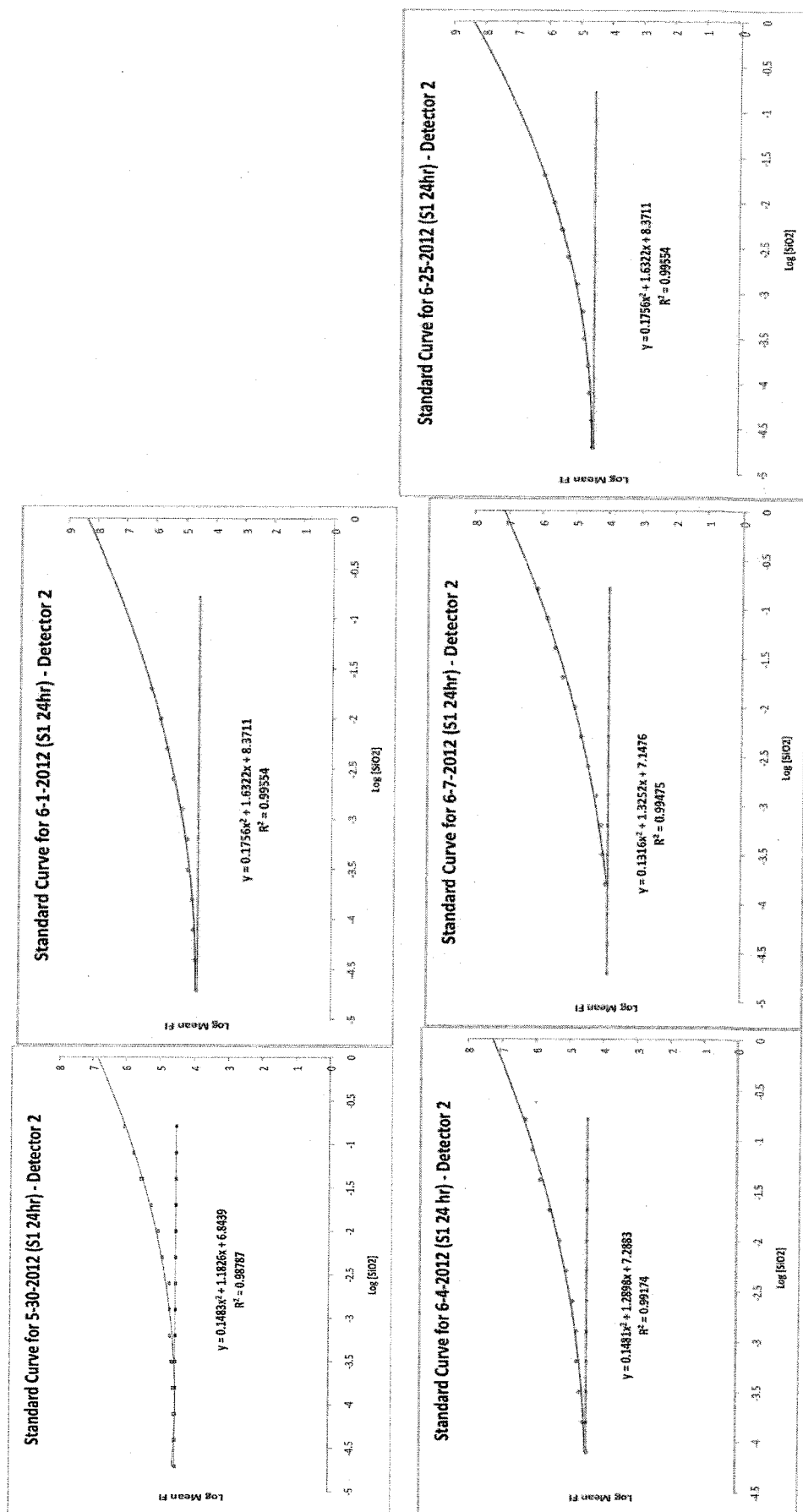
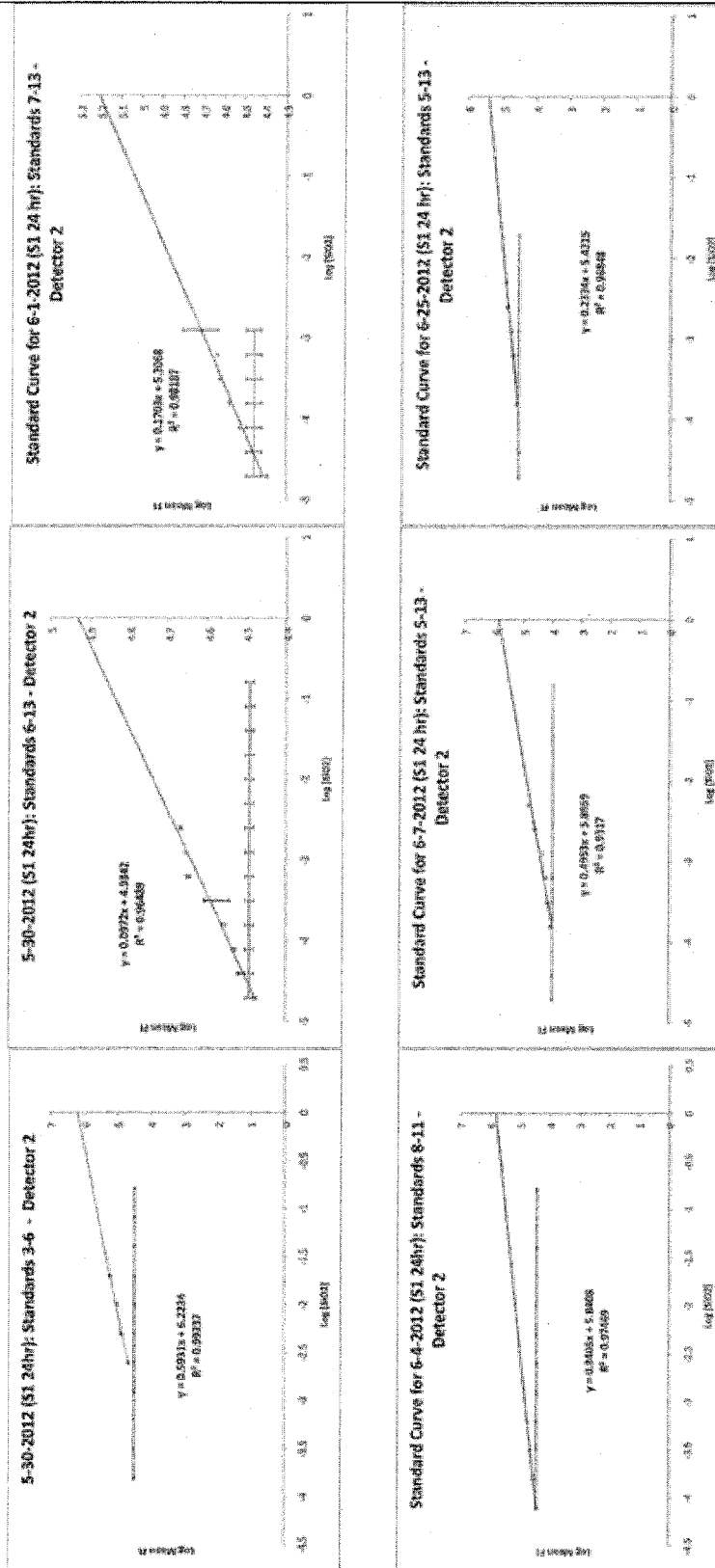


Figure 2X9



Linear regression analysis in conjunction with spectrophotometry was used to discern the unknown concentrations in each receptacle at the 4 hour and 24 hour time points. A linear trendline was applied to the relevant concentration/intensity ranges to obtain an equation with the form $y = mx + b$; all $R^2 > 0.9300$. 10^x was solved for to obtain each concentration at 0, 4, and 24 hour times. This value was then multiplied by 5.1 to give the total mg of SiO₂ at each time point. The final amount was obtained by subtracting out the value obtained from the 0 hour sample.

Figure 3X9

Total SiO₂ (mg) in Receptacle (5.1 ml) after 24 Hours

SiO₂ (mg) in Receptacle (5.1 ml)

0.3

0.25

0.2

0.15

0.1

0.05

0

1

Series1

SiO ₂ Cores w/o SLB	DOPC/Chol Protocells	DSPC/Chol Protocells	DOPC/Chol/PEG Protocells	DSPC/Chol/PEG Protocells	DOPE/DOPC/Chol Protocells	DOPE/DOPC/PEG/Chol Protocells	DOTAP Protocells	DOTAP/Chol/PEG Protocells	DPPC Protocells
0.082490138	0.005132522	0.002693505	0.000900241	0.000915752	0.001454397	0.010323011	5.48627E-05	0.000210389	0.001235394

Protocell Formulation

Figure 4X9

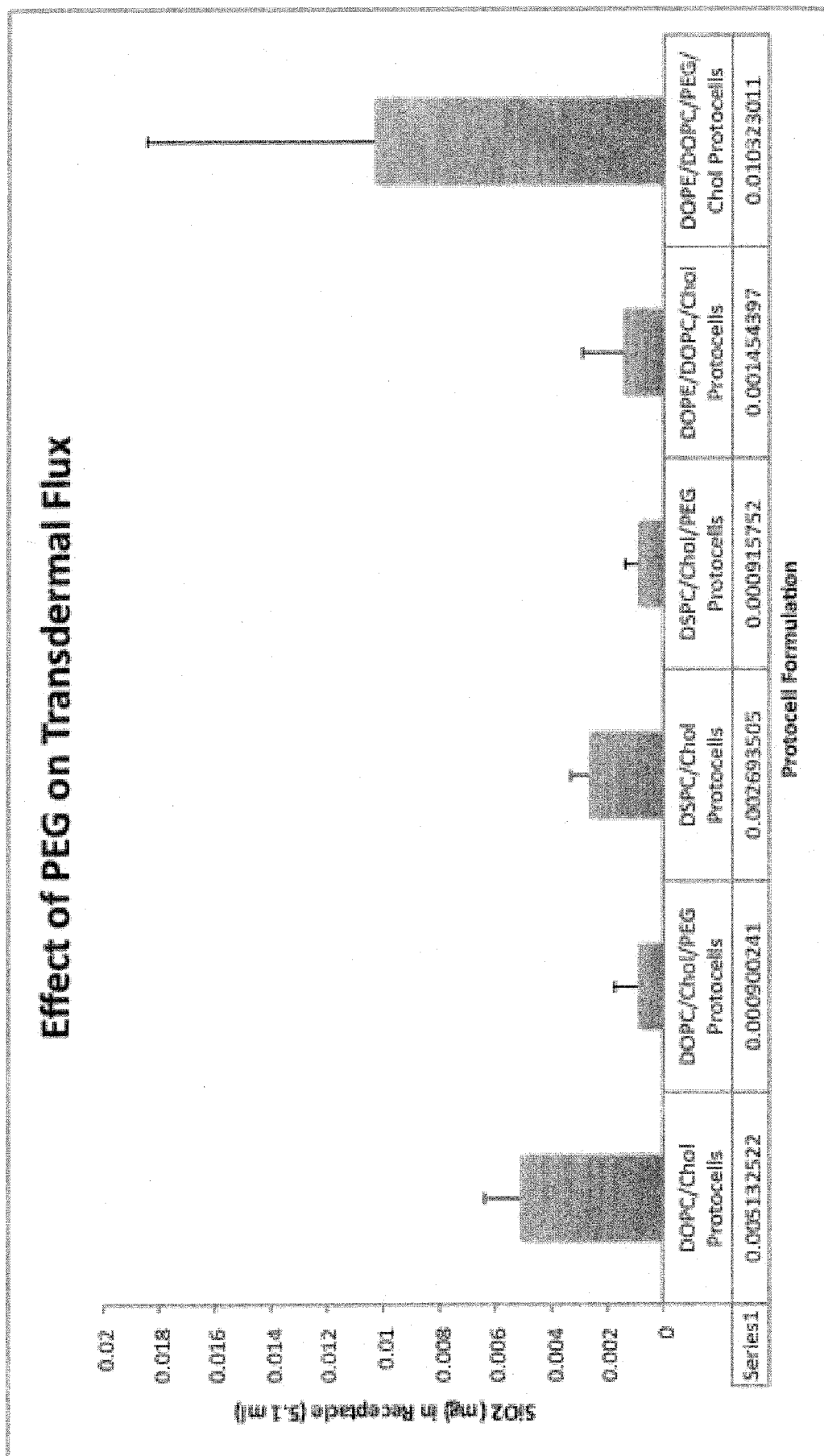


Figure 5X9

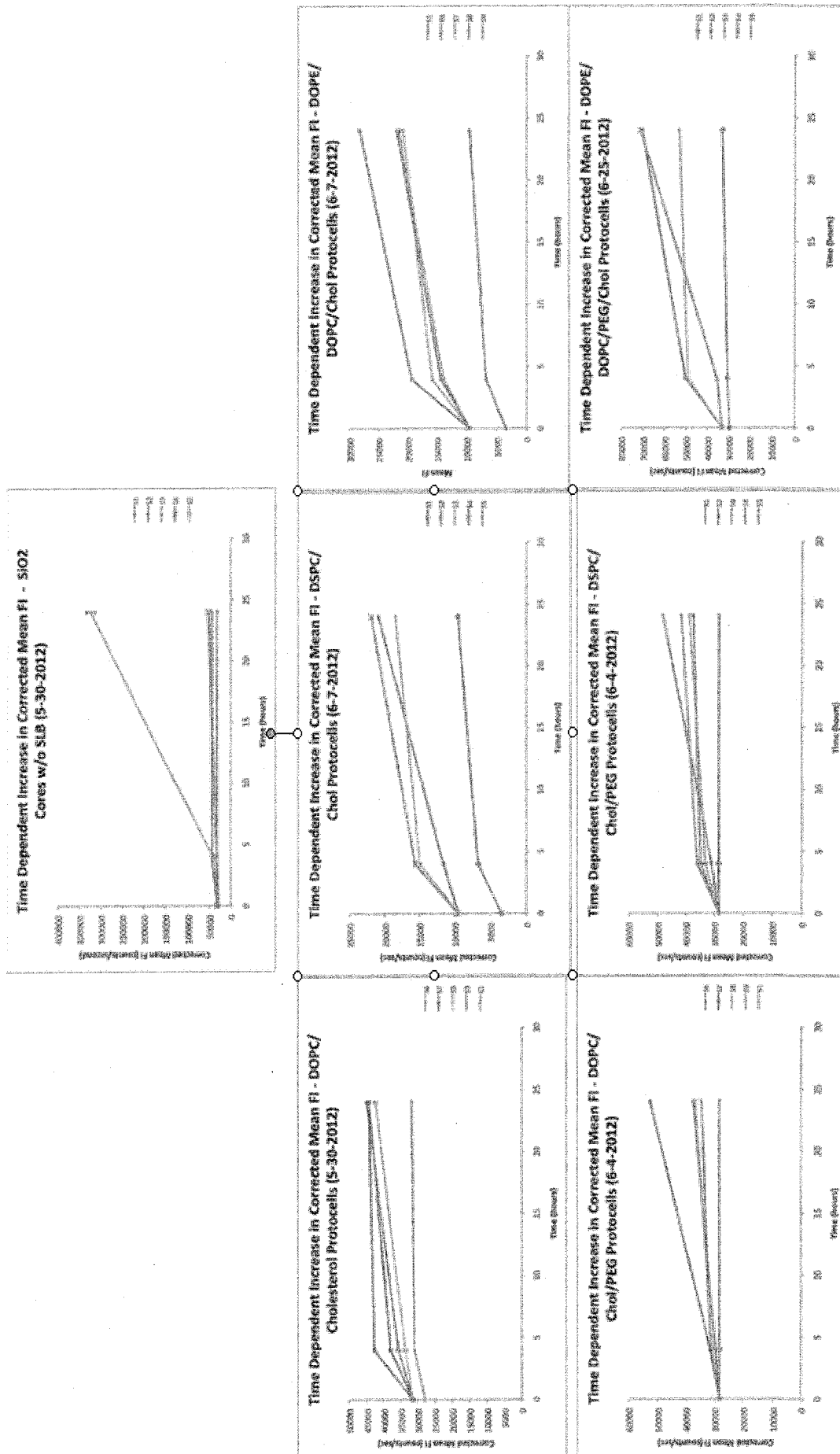


Figure 6X9

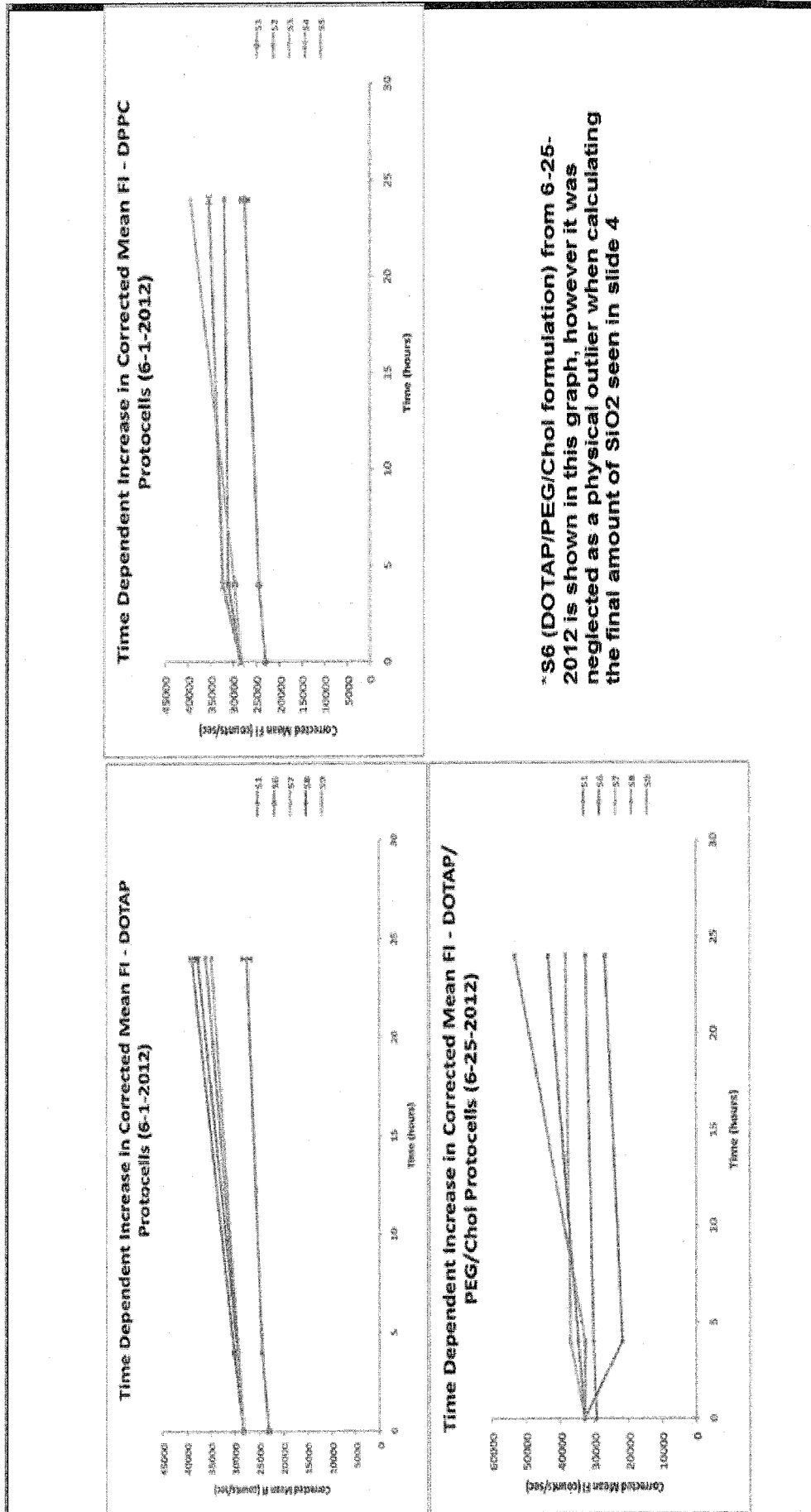
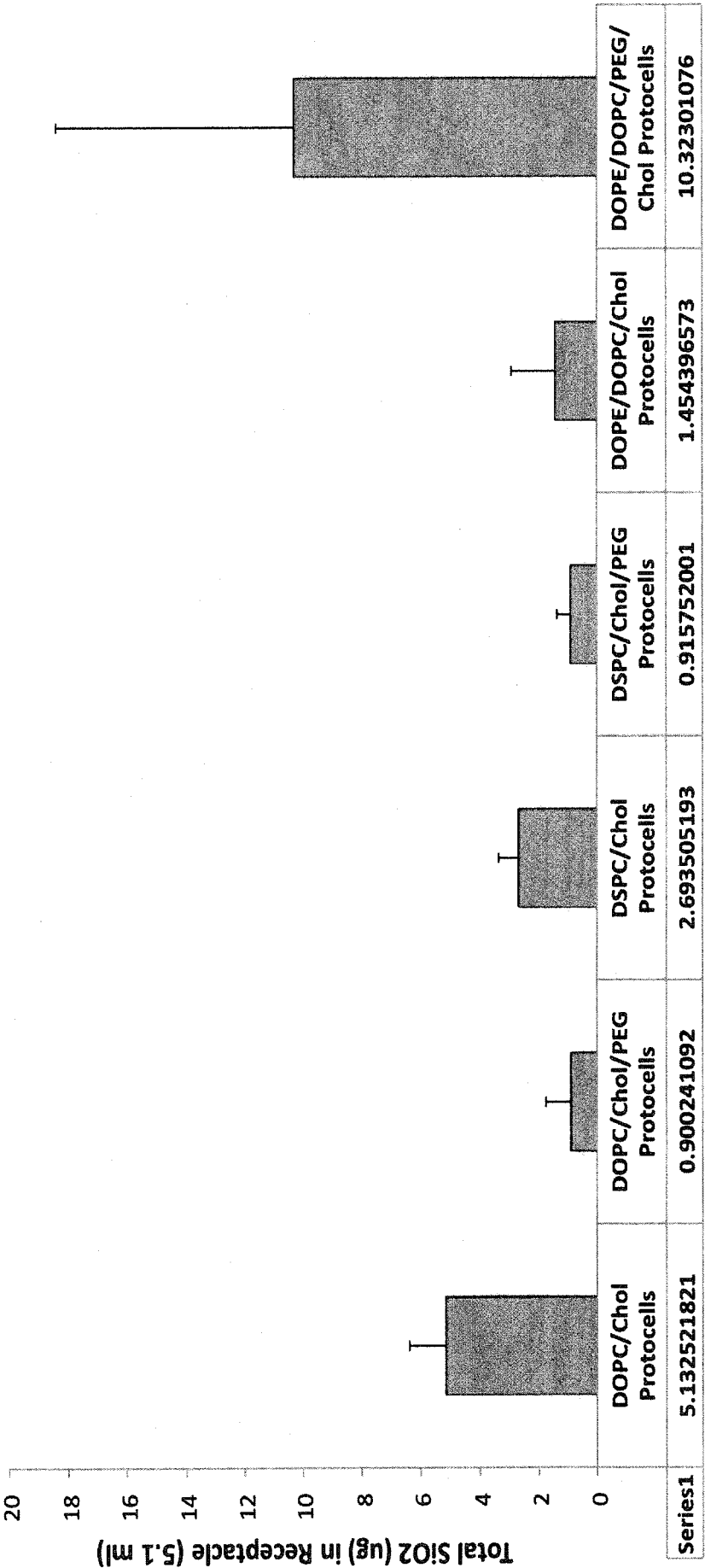


Figure 7X9

Effect of SLB Formulation on Transdermal Kinetics



SLB Formulation

Figure 8X9

Can Protocells penetrate the stratum corneum?

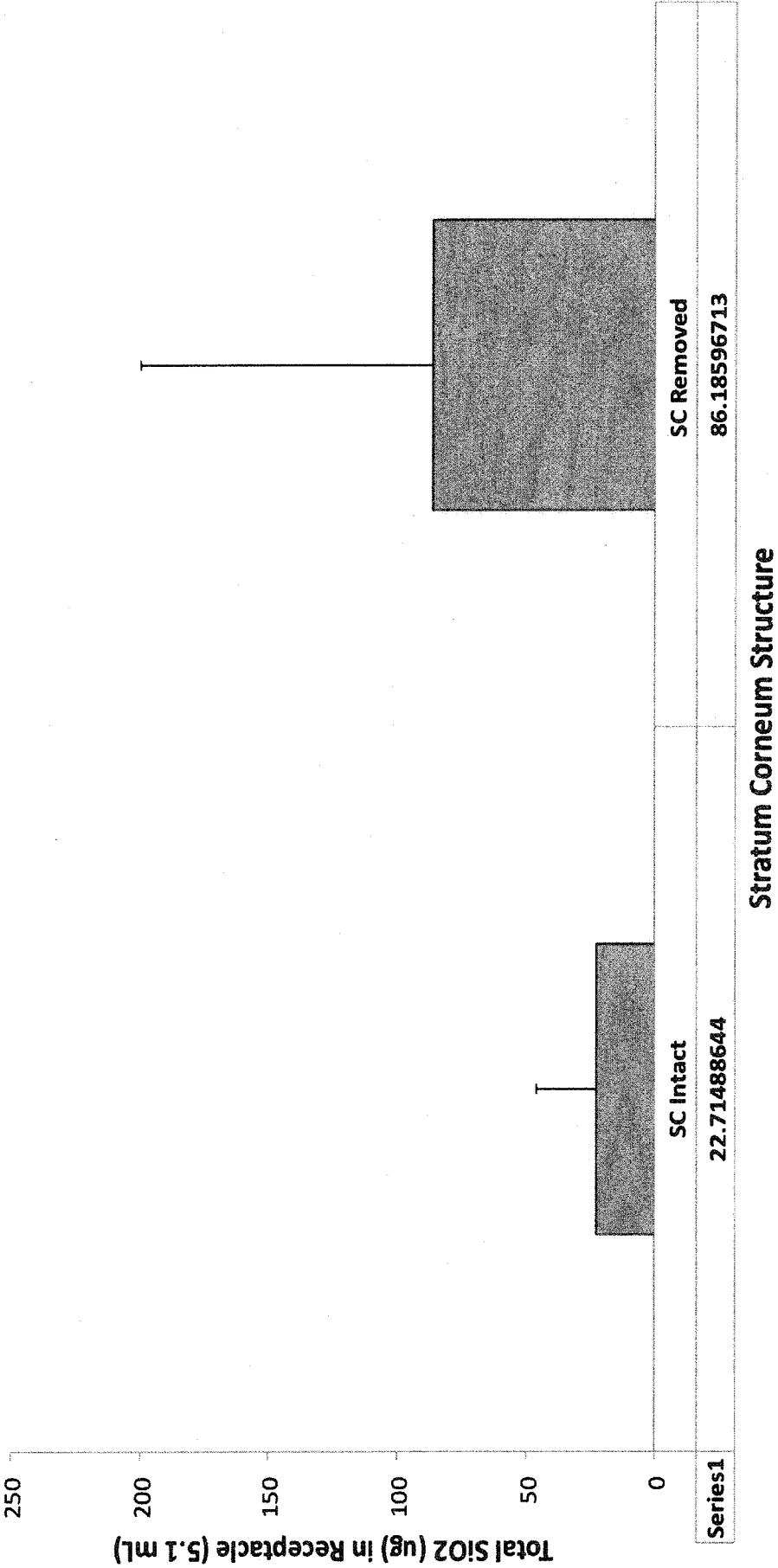


Figure 9X9

