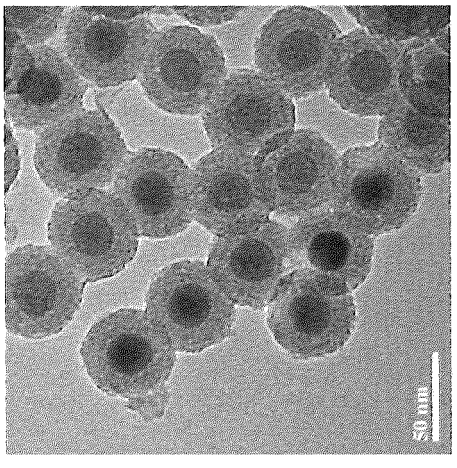
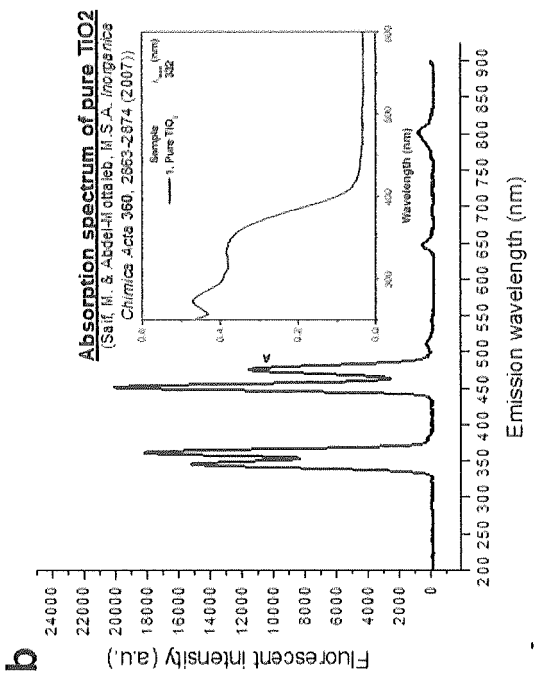


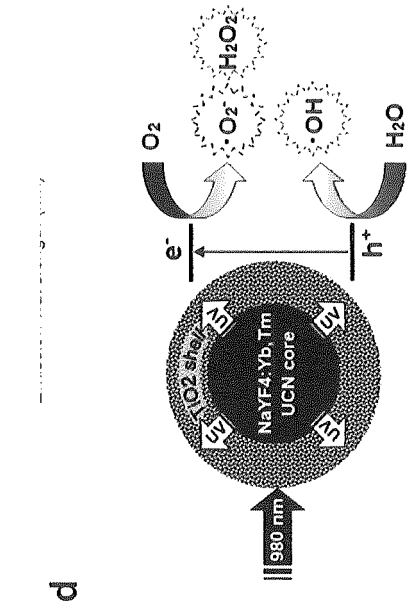
a

FIG. 1A



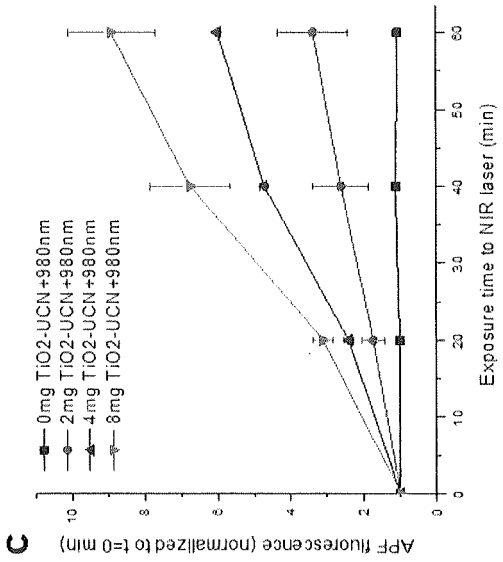
b

FIG. 1B



d

FIG. 1D



c

FIG. 1C

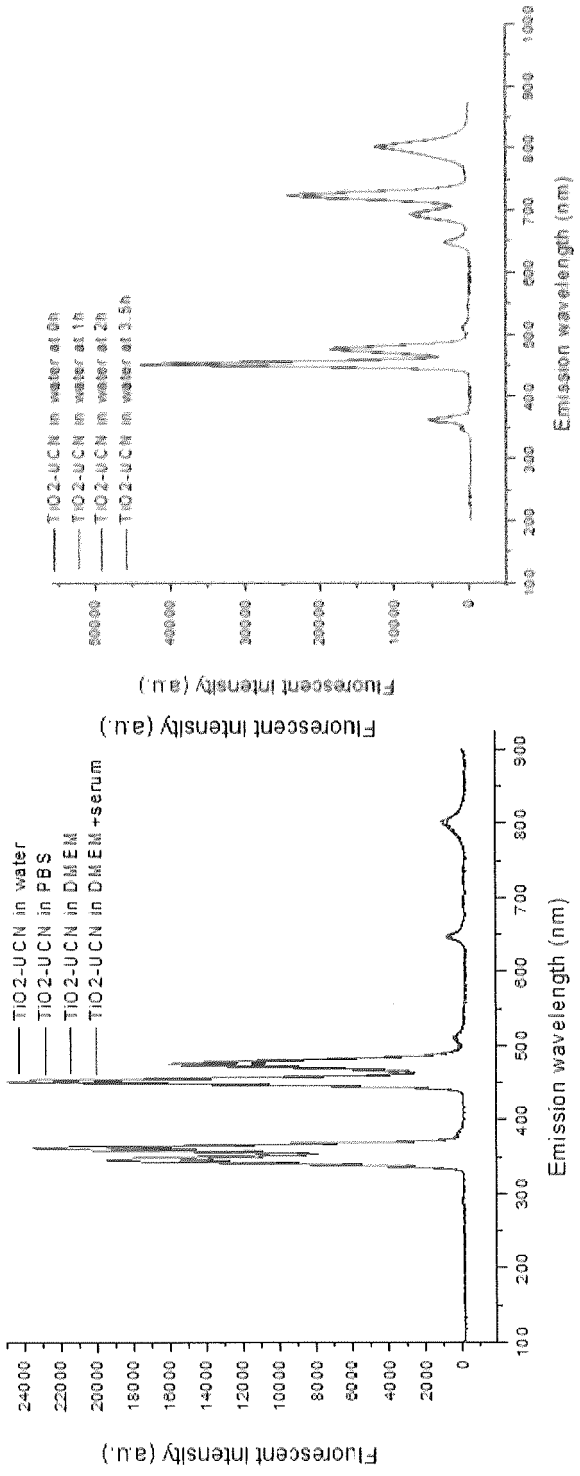


FIG. 2A

FIG. 2B

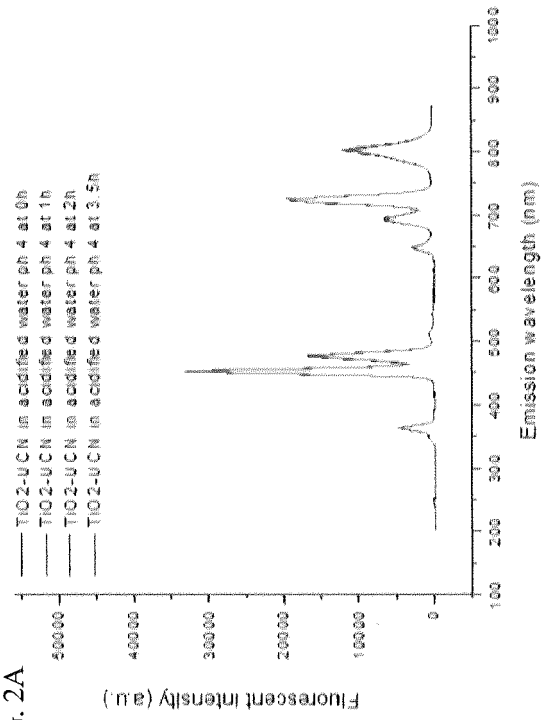


FIG. 2C

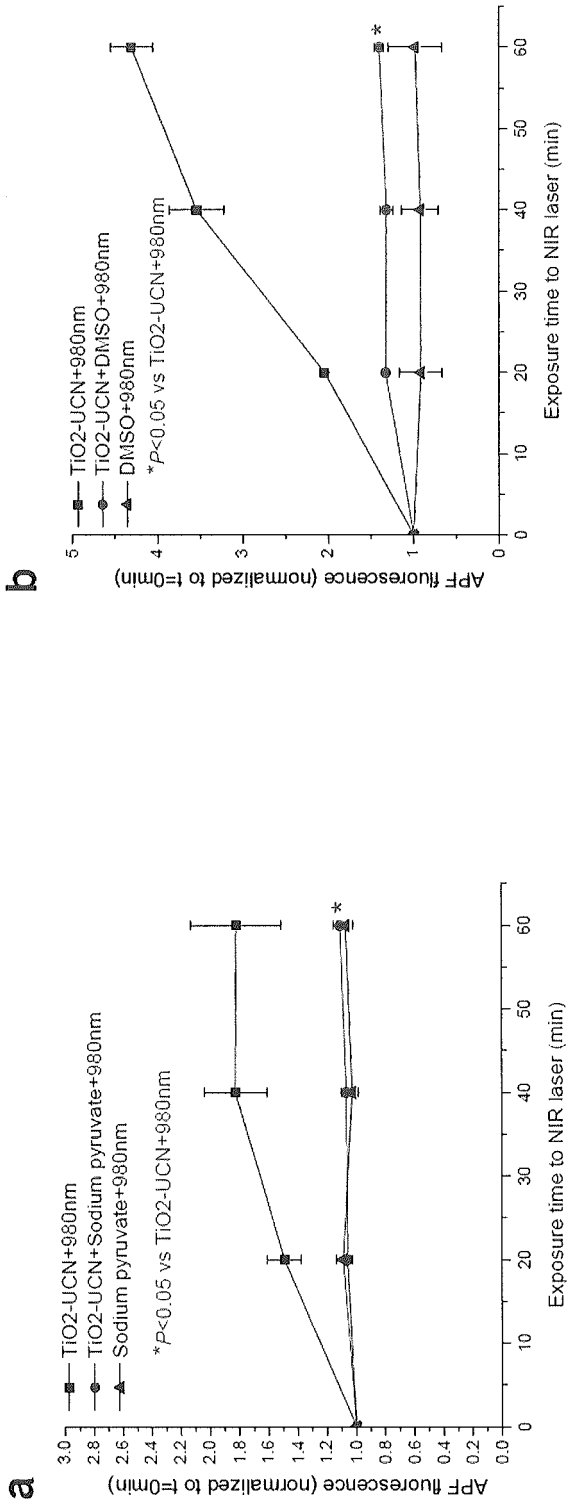


FIG. 3A

FIG. 3B

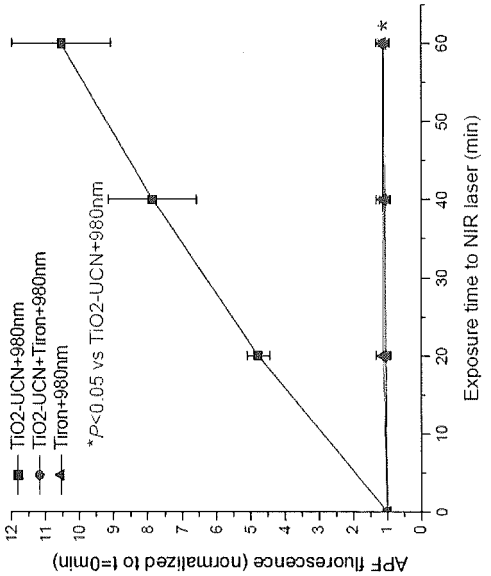


FIG. 3C

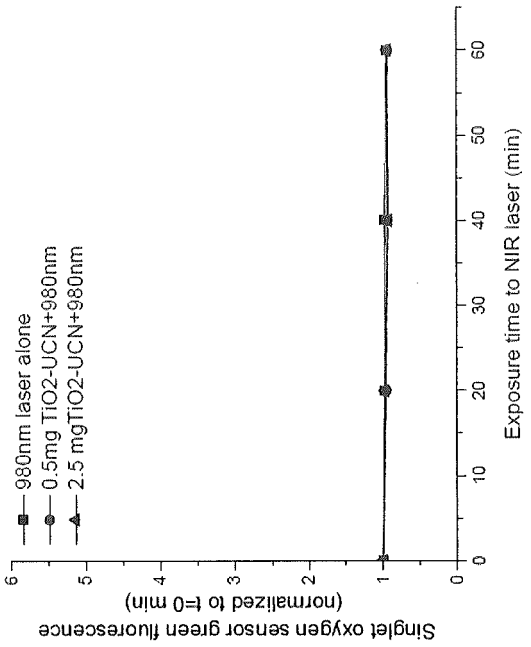

980nm laser alone
0.5mg TiO2-UCN+980nm
2.5 mgTiO2-UCN+980nm
Singlet oxygen sensor green fluorescence (normalized to t=0 min)
Exposure time to NIR laser (min)
0
1
2
3
4
5
6
0
10
20
30
40
50
60

FIG. 3E

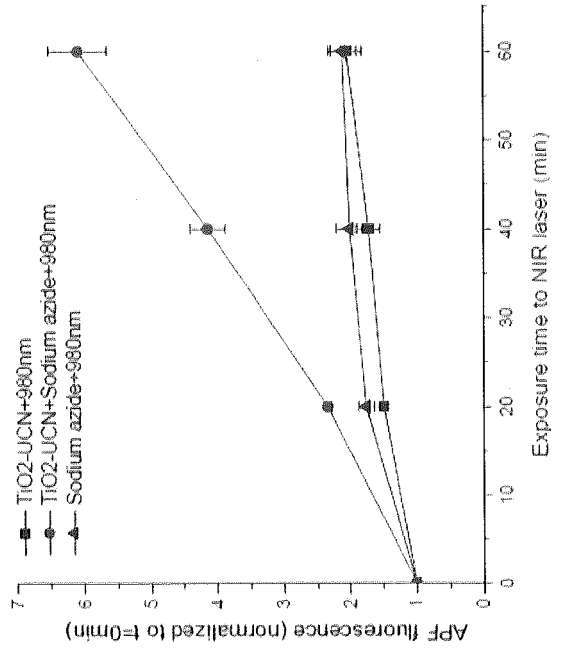

TiO2-UCN+980nm
TiO2-UCN+Sodium azide+980nm
Sodium azide+980nm
APF fluorescence (normalized to t=0min)
Exposure time to NIR laser (min)
0
1
2
3
4
5
6
7
0
10
20
30
40
50
60

FIG. 3D

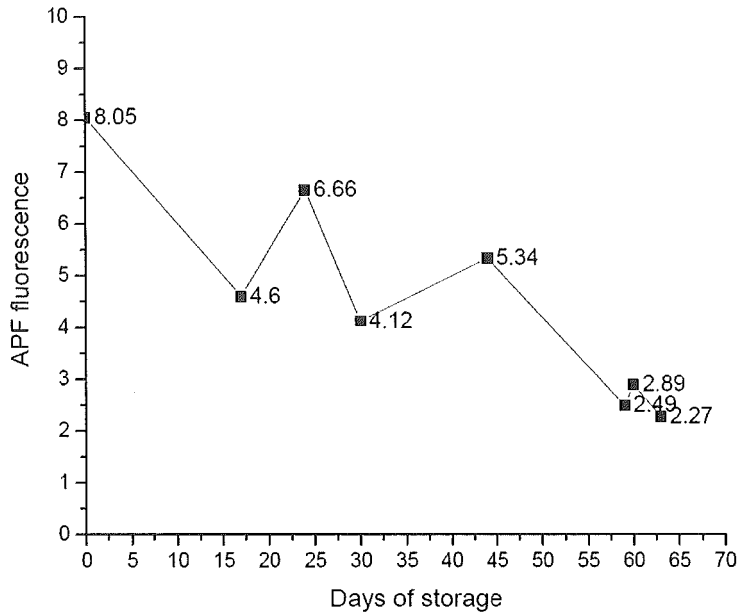

APF fluorescence
Days of storage
8.05
4.6
6.66
4.12
5.34
2.89
2.49
2.27

FIG. 4

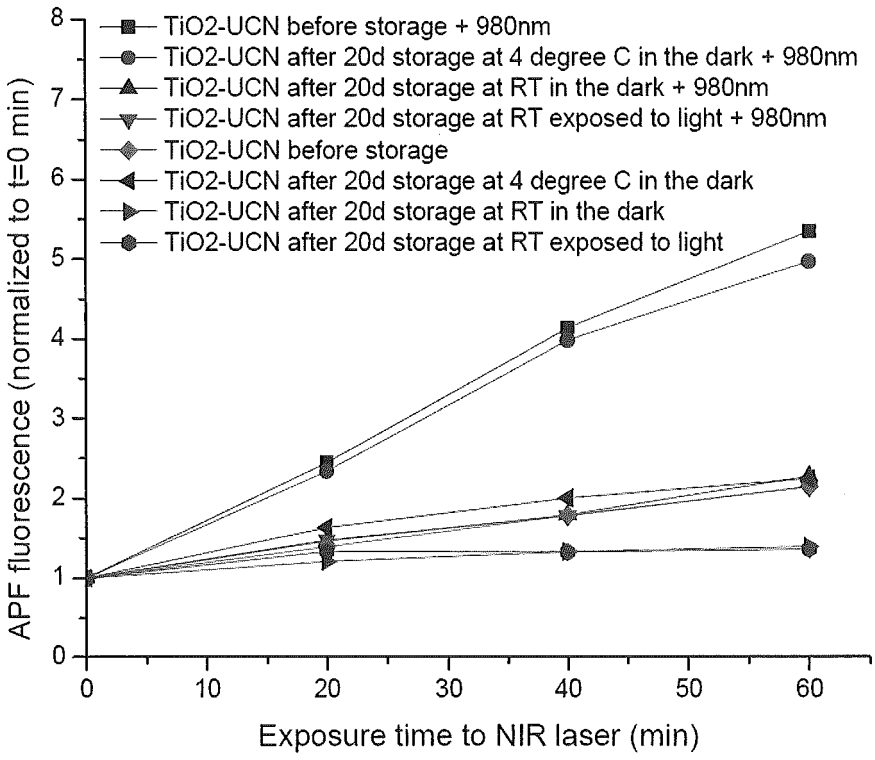

TiO2-UCN before storage + 980nm
TiO2-UCN after 20d storage at 4 degree C in the dark + 980nm
TiO2-UCN after 20d storage at RT in the dark + 980nm
TiO2-UCN after 20d storage at RT exposed to light + 980nm
TiO2-UCN before storage
TiO2-UCN after 20d storage at 4 degree C in the dark
TiO2-UCN after 20d storage at RT in the dark
TiO2-UCN after 20d storage at RT exposed to light
APF fluorescence (normalized to t=0 min)
Exposure time to NIR laser (min)

FIG. 5

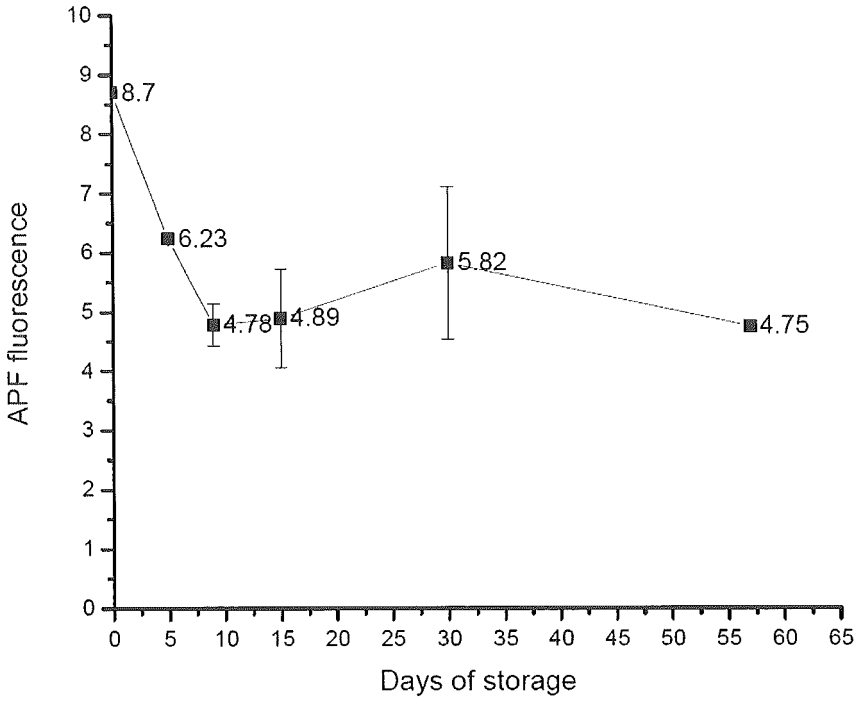

APF fluorescence
Days of storage
8.7
6.23
4.78
4.89
5.82
4.75

FIG. 6

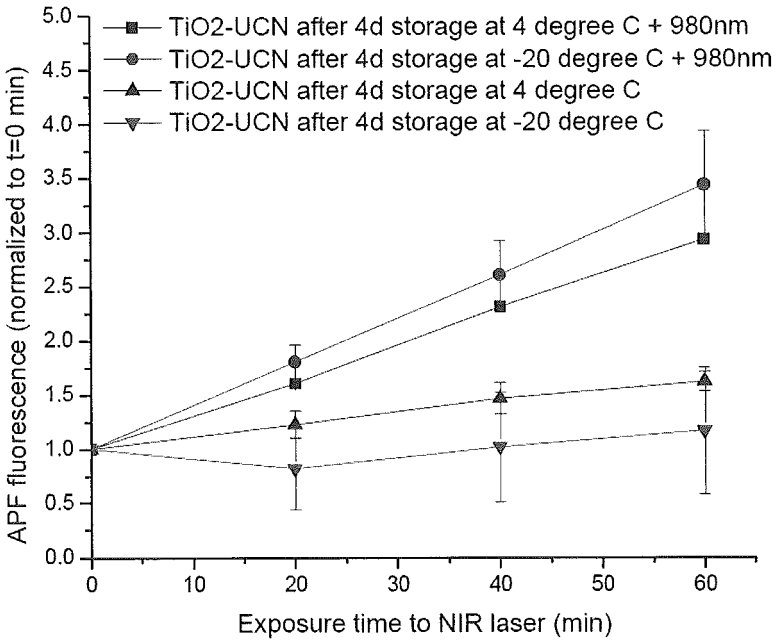

TiO2-UCN after 4d storage at 4 degree C + 980nm
TiO2-UCN after 4d storage at -20 degree C + 980nm
TiO2-UCN after 4d storage at 4 degree C
TiO2-UCN after 4d storage at -20 degree C
APF fluorescence (normalized to t=0 min)
Exposure time to NIR laser (min)

FIG. 7

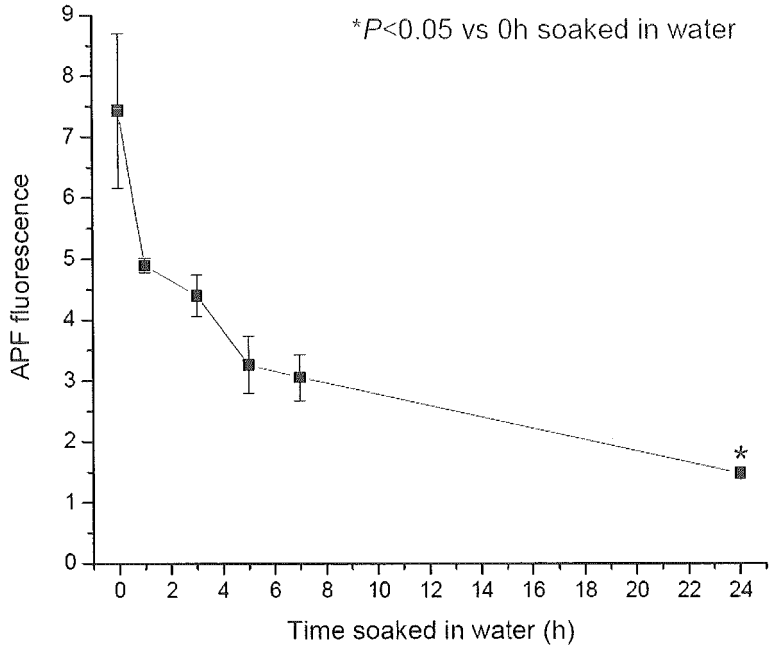

*P<0.05 vs 0h soaked in water
APF fluorescence
Time soaked in water (h)
0
1
2
3
4
5
6
7
8
9
0
2
4
6
8
10
12
14
16
18
20
22
24
*

FIG. 8

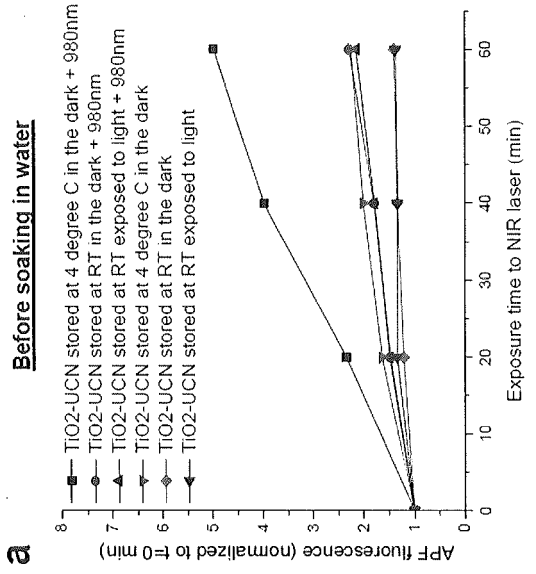


FIG. 9A

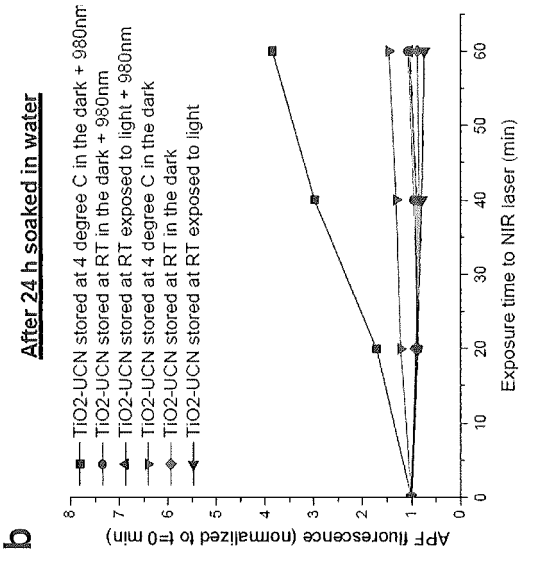


FIG. 9B

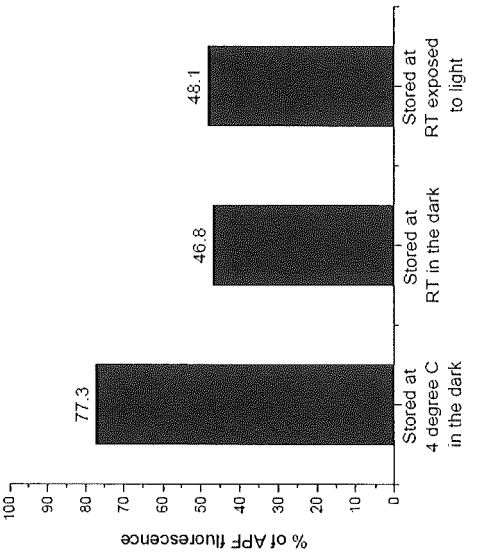


FIG. 9C

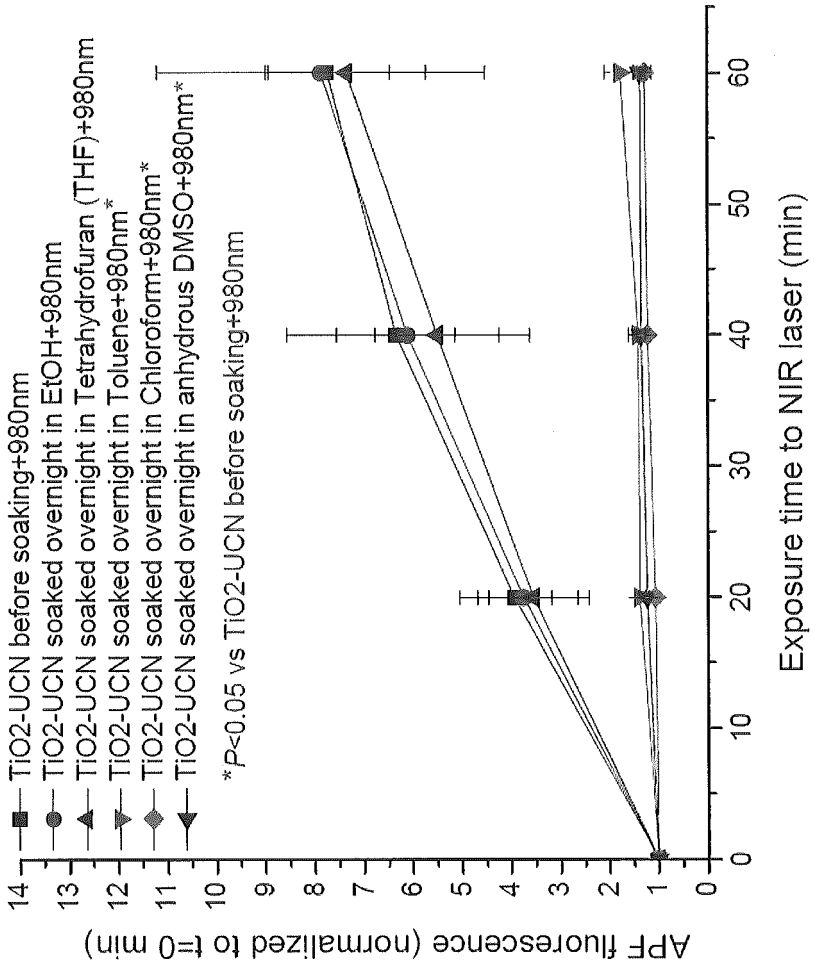

TiO2-UCN before soaking+980nm
TiO2-UCN soaked overnight in EtOH+980nm
TiO2-UCN soaked overnight in Tetrahydrofuran (THF)+980nm
TiO2-UCN soaked overnight in Toluene+980nm*
TiO2-UCN soaked overnight in Chloroform+980nm*
TiO2-UCN soaked overnight in anhydrous DMSO+980nm*
*P<0.05 vs TiO2-UCN before soaking+980nm
APF fluorescence (normalized to t=0 min)
Exposure time to NIR laser (min)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0
10
20
30
40
50
60

FIG. 10

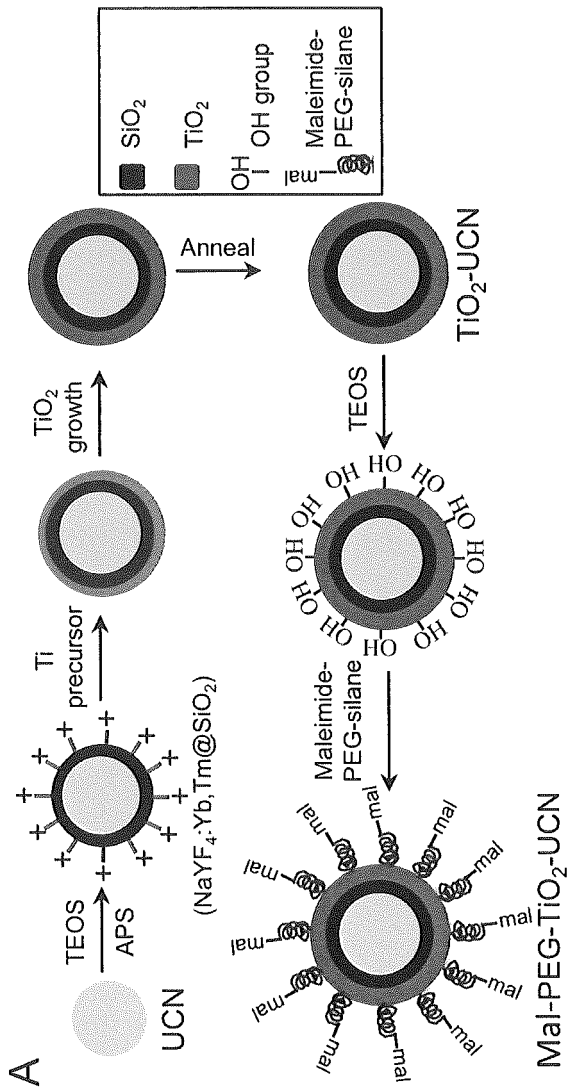

A
UCN
TEOS
APS
(NaYF4:Yb,Tm@SiO2)
Ti precursor
TiO2 growth
Anneal
TiO2-UCN
TEOS
Maleimide-PEG-silane
Mal-PEG-TiO2-UCN
SiO2
TiO2
OH group
Maleimide-PEG-silane

FIG. 11A

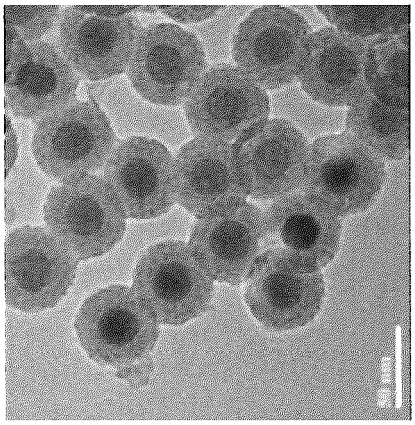


FIG. 11B

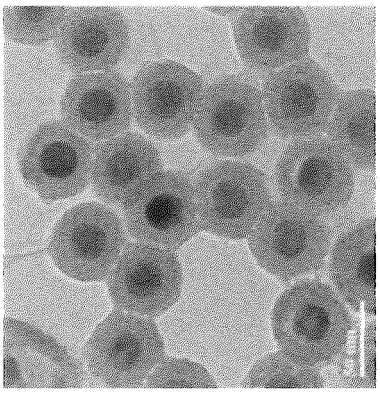


FIG. 11C

FIG. 11D

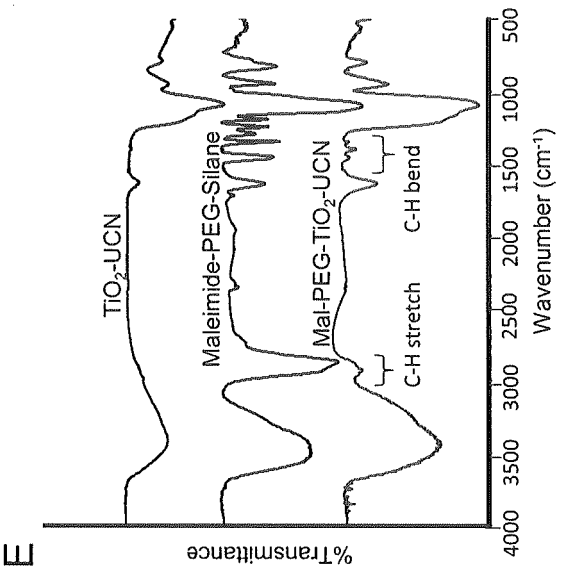


FIG. 11E

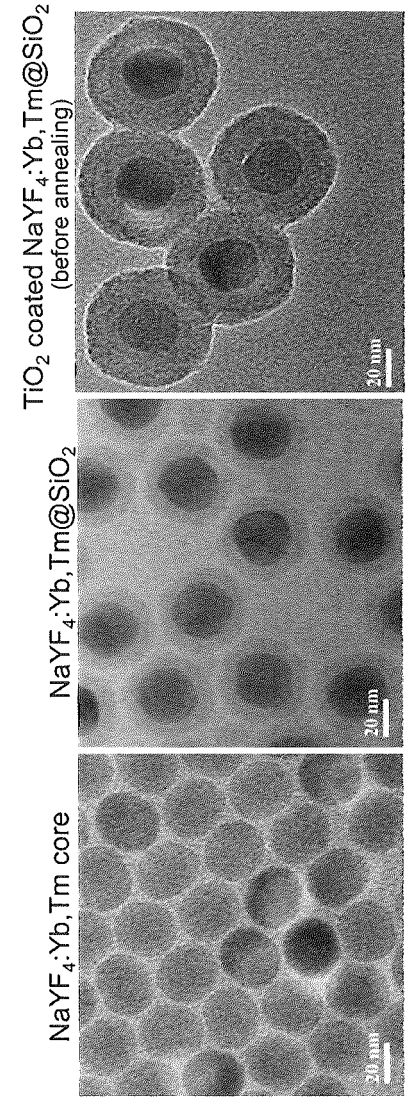


FIG. 12A

FIG. 12B

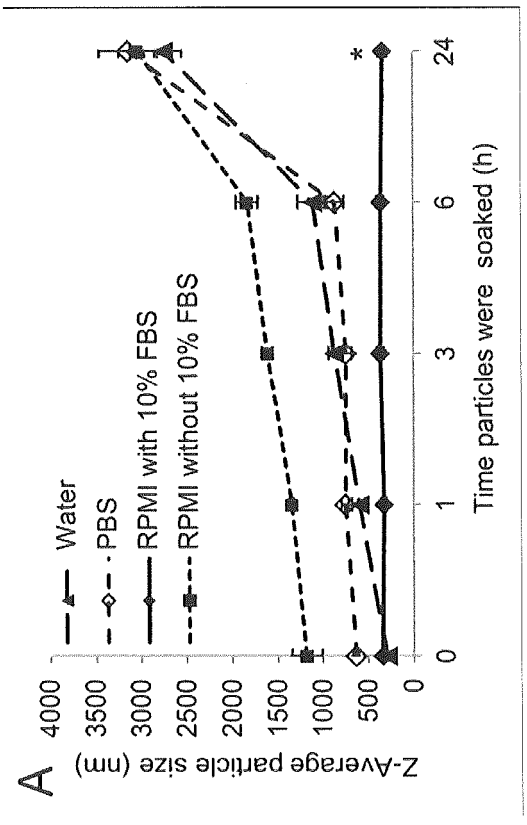


FIG. 13A

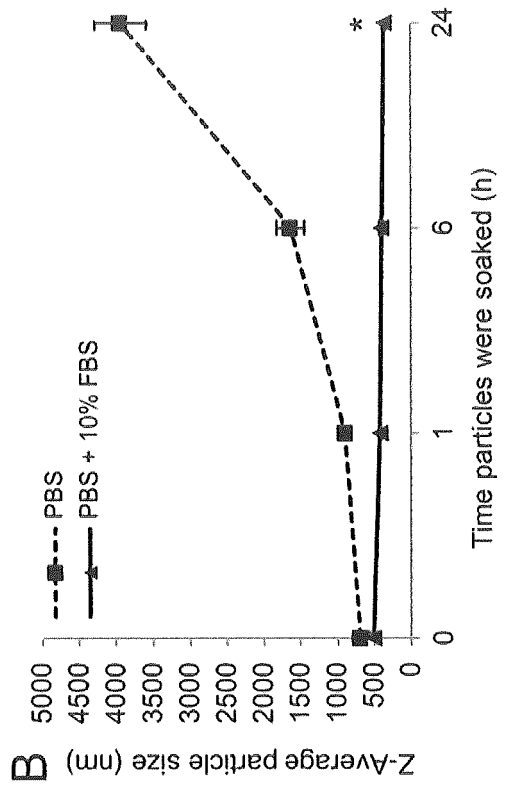


FIG. 13B

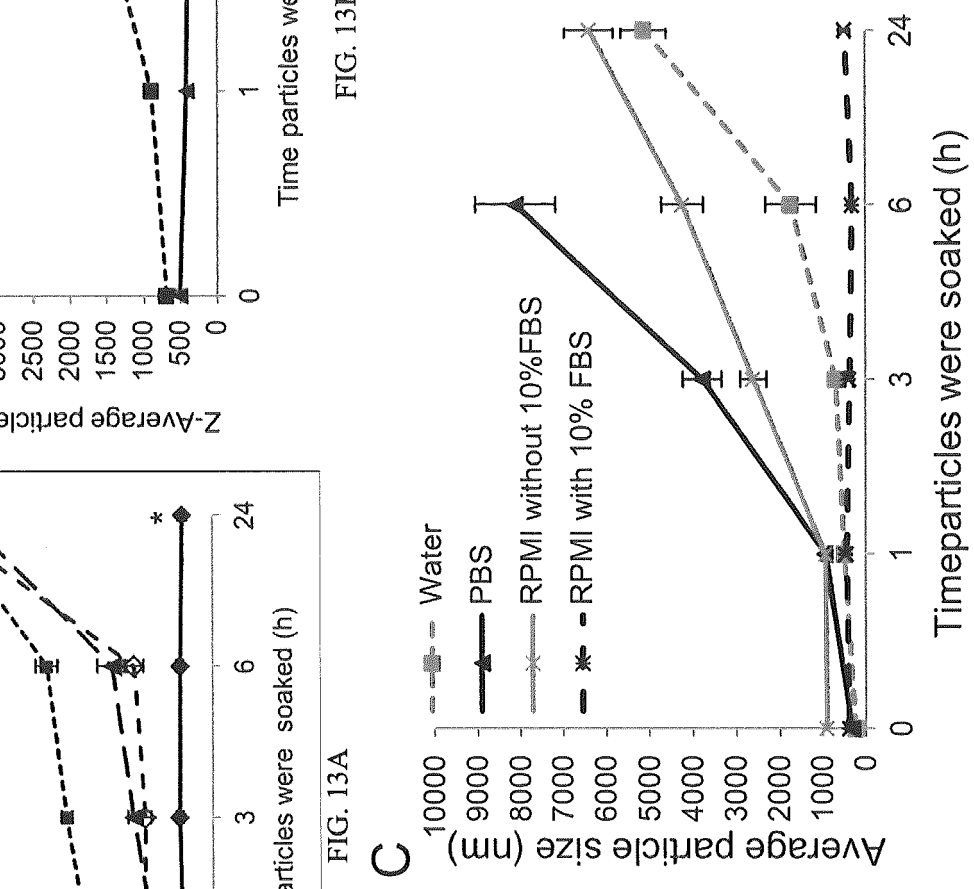


FIG. 13C

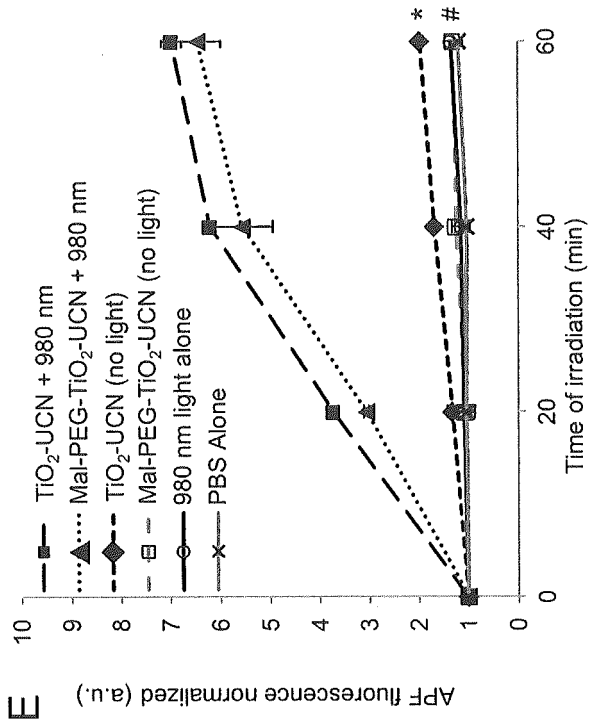


FIG. 13E

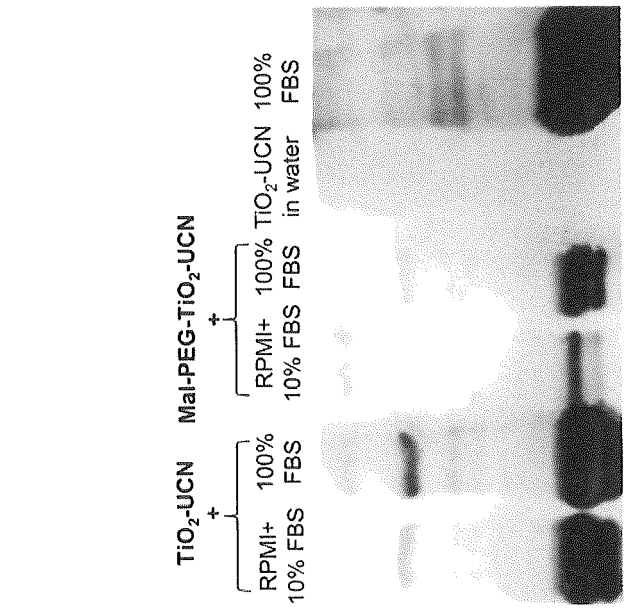


FIG. 13D

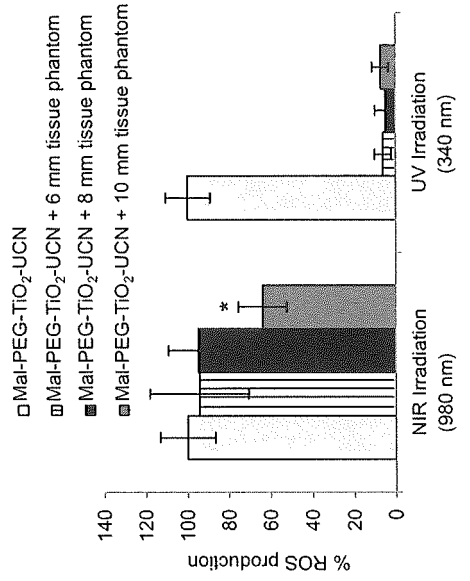


FIG. 13F

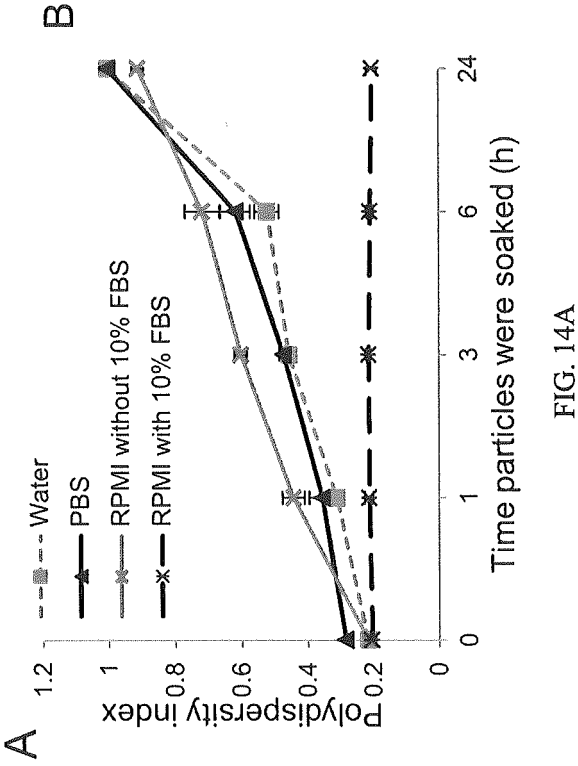


FIG. 14A

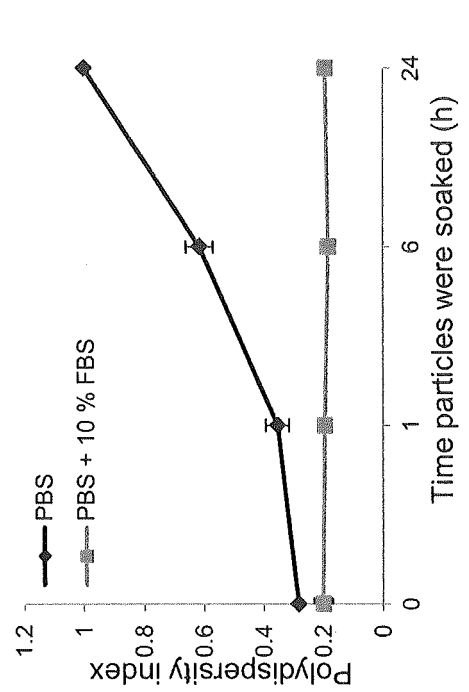


FIG. 14B

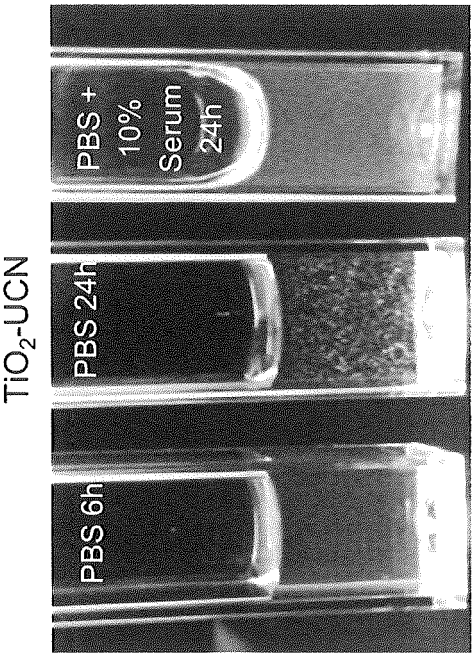


FIG. 14D

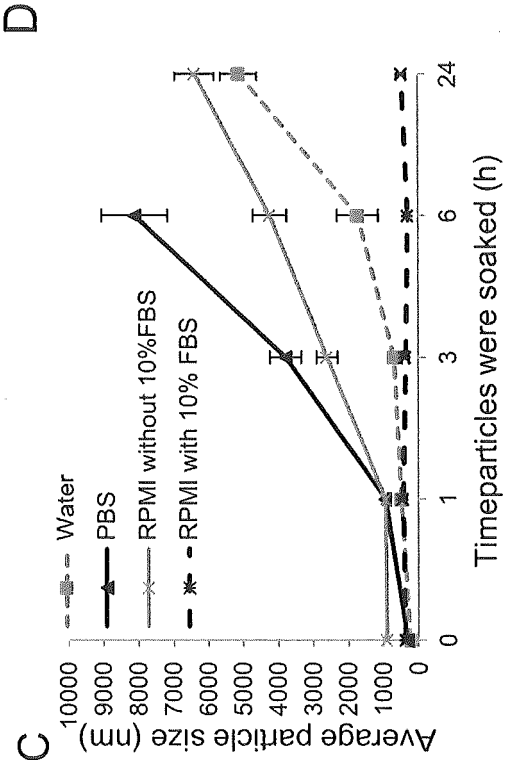
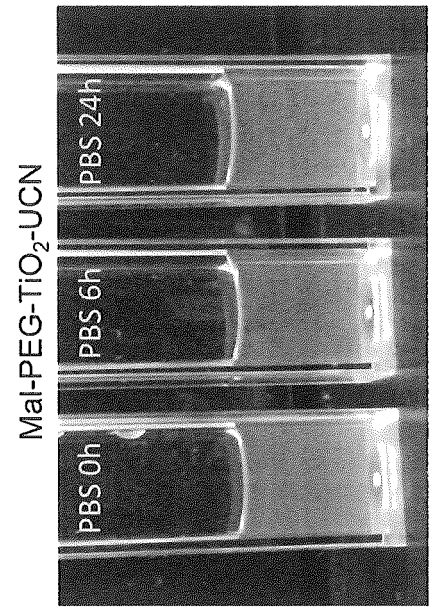
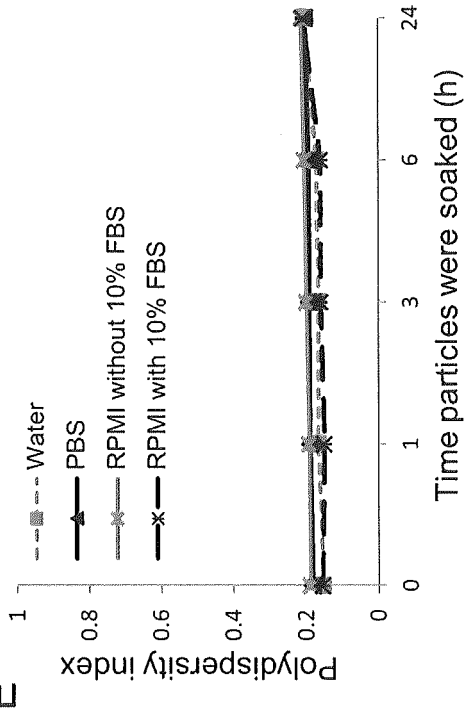


FIG. 14C



F

FIG. 14F



E

FIG. 14E

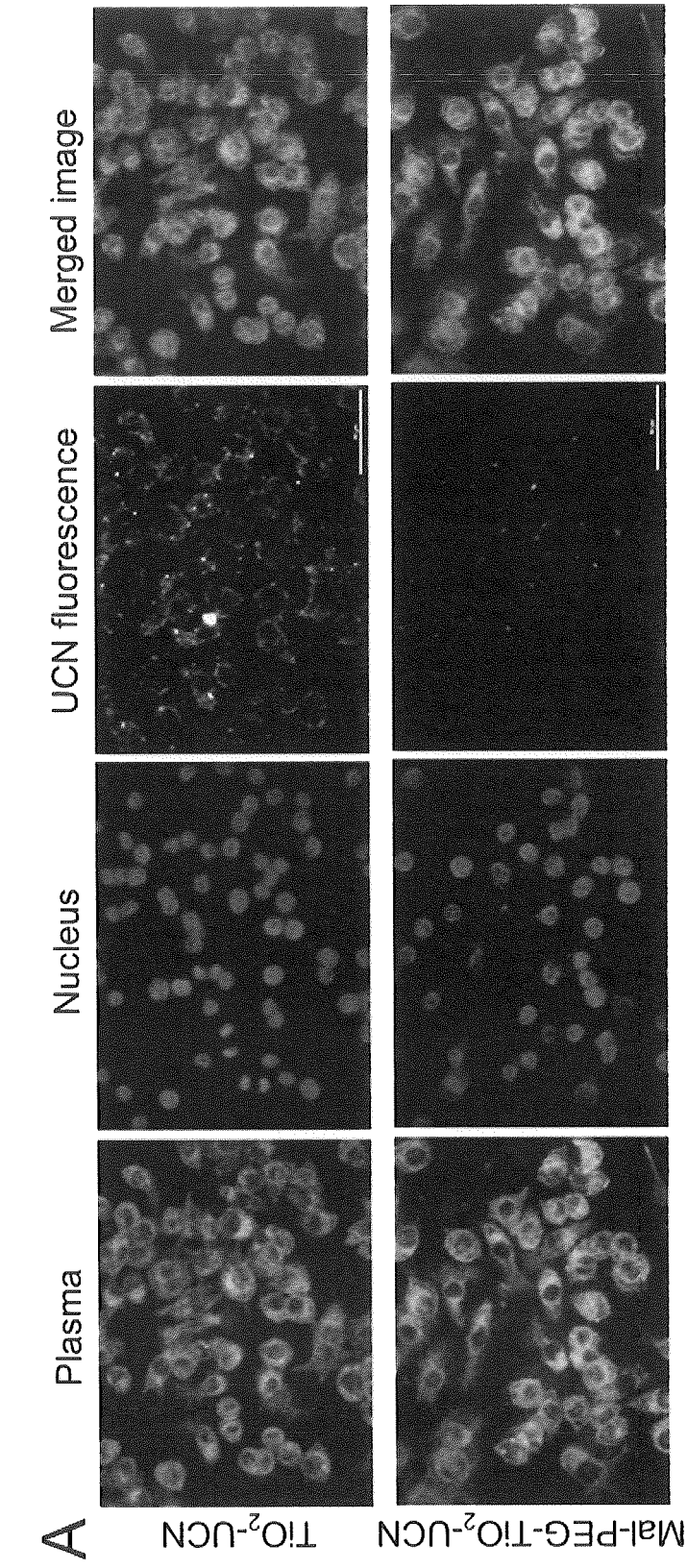

A
TiO2-UCN
Mal-PEG-TiO2-UCN
Plasma
Nucleus
UCN fluorescence
Merged image

FIG. 15A

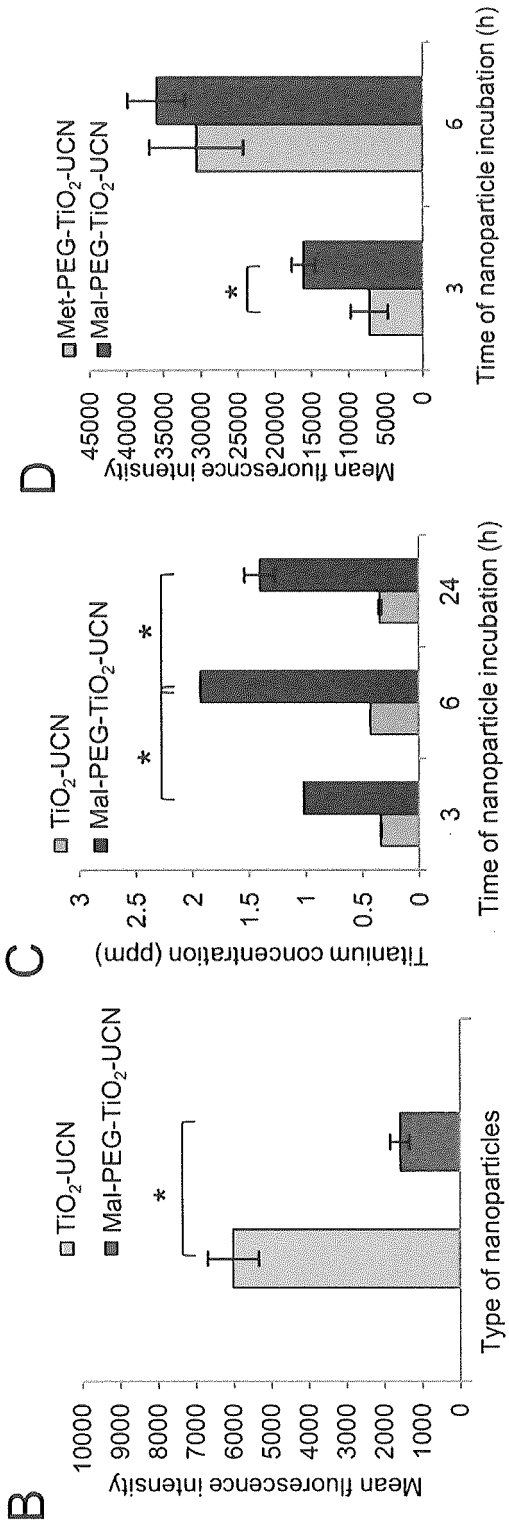


FIG. 15B

FIG. 15C

FIG. 15D

FIG. 15E

FIG. 15F

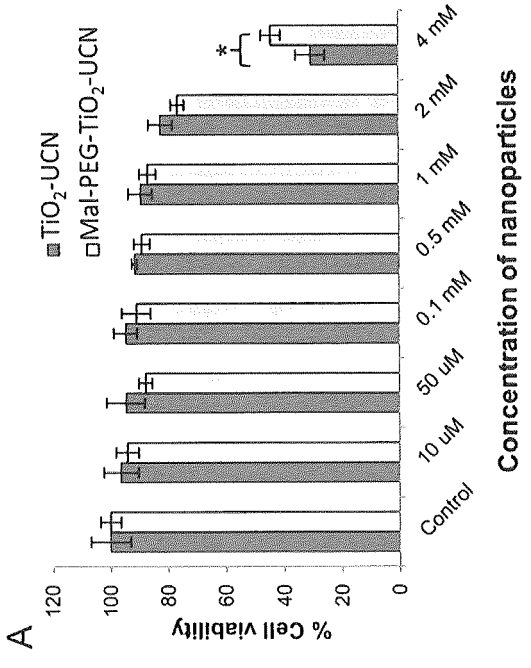


FIG. 16A

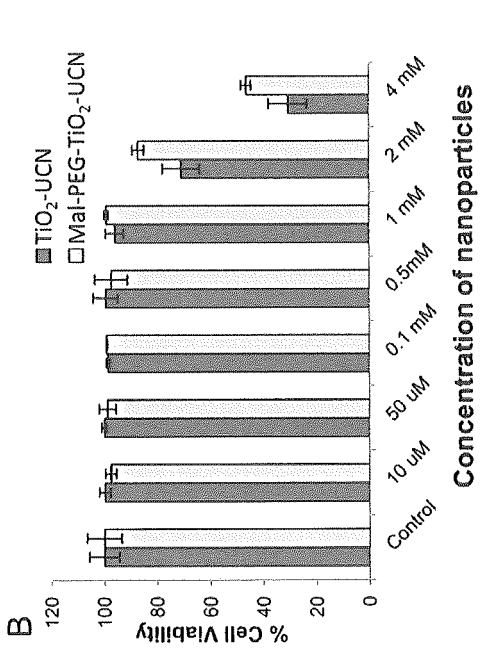


FIG. 16B

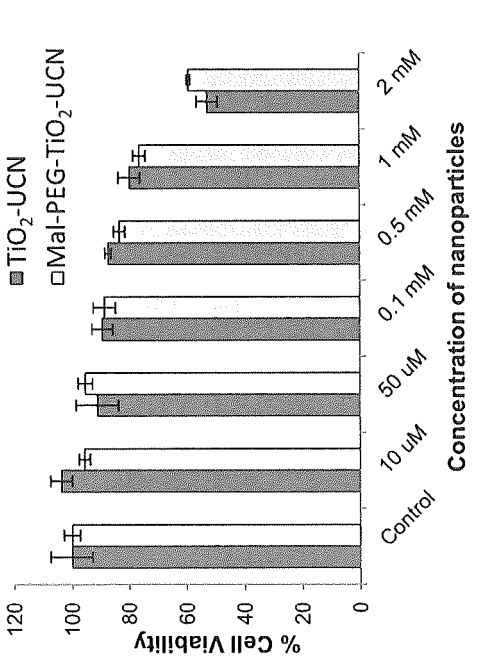


FIG. 16C

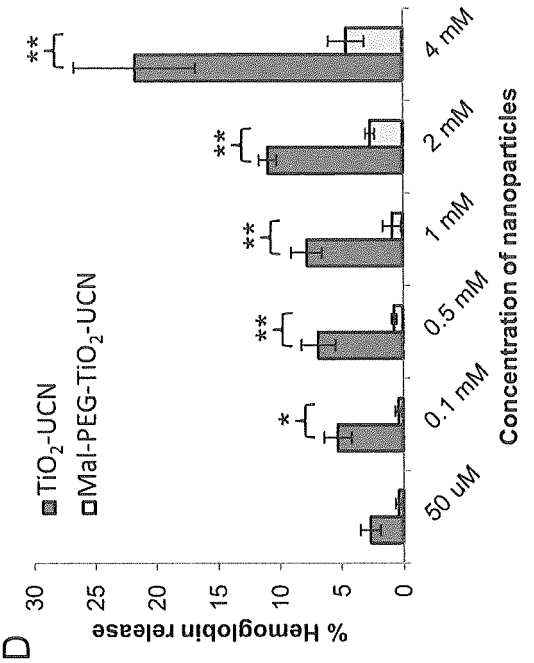


FIG. 16D

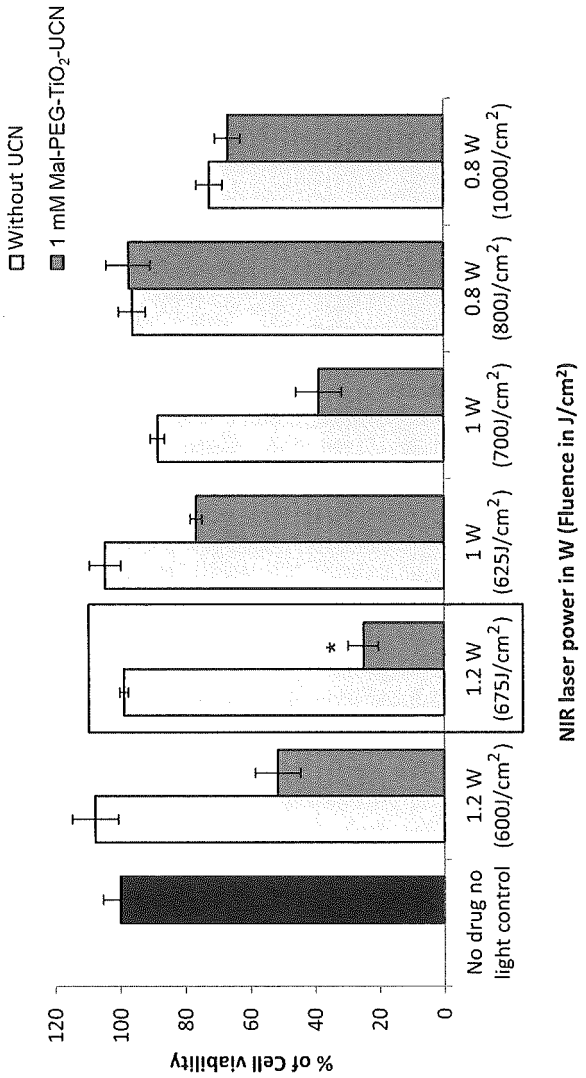

Without UCN
1 mM Mal-PEG-TiO2-UCN
% of Cell viability
120
100
80
60
40
20
0
No drug no light control
1.2 W (600J/cm2)
1.2 W (675J/cm2)
1 W (625J/cm2)
1 W (700J/cm2)
0.8 W (800J/cm2)
0.8 W (1000J/cm2)
*
NIR laser power in W (Fluence in J/cm2)

FIG. 17

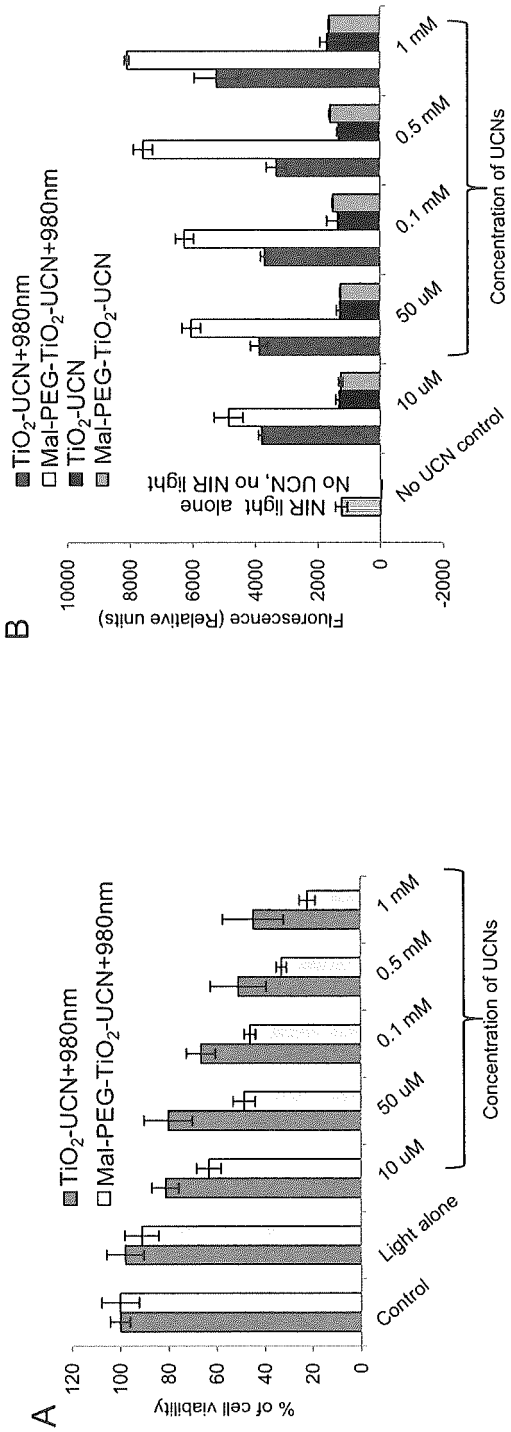


FIG. 18A

FIG. 18B

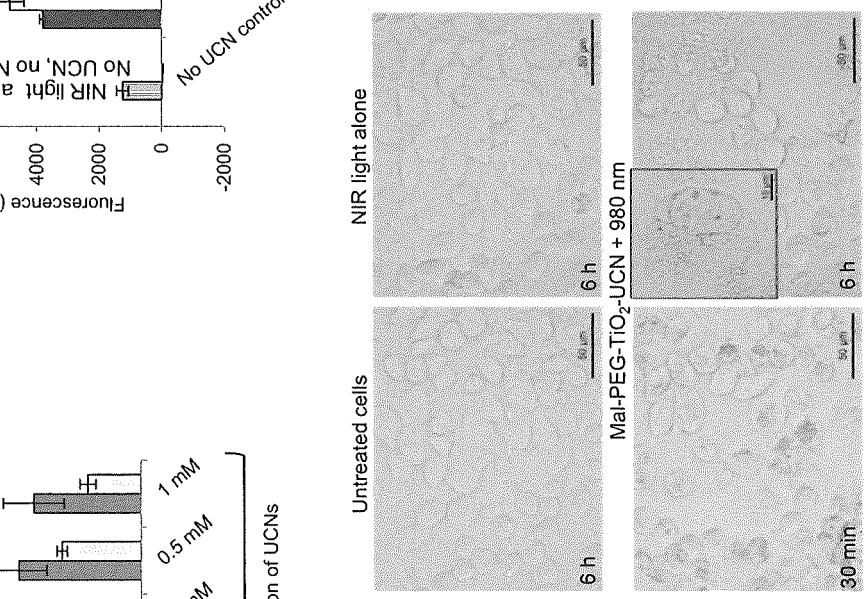


FIG. 18C

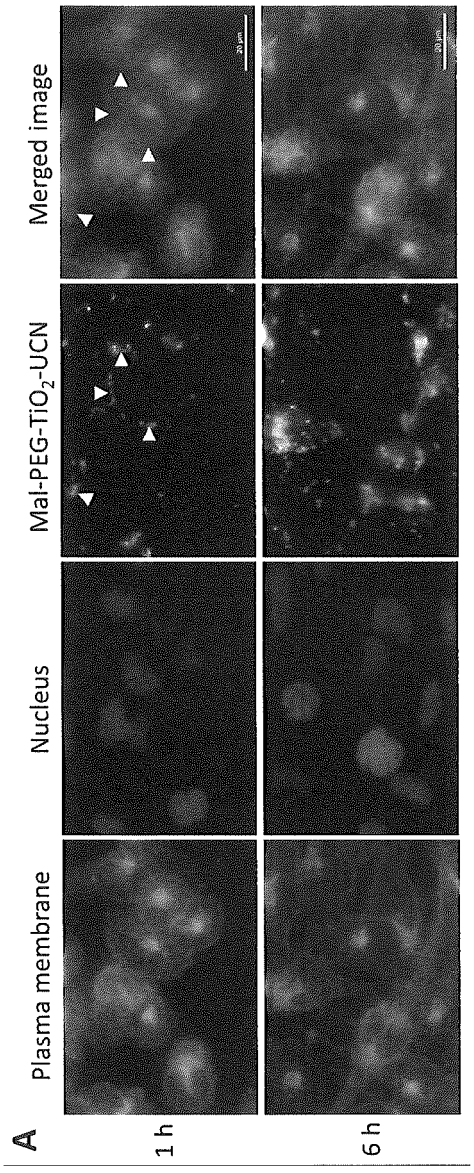


FIG. 19A

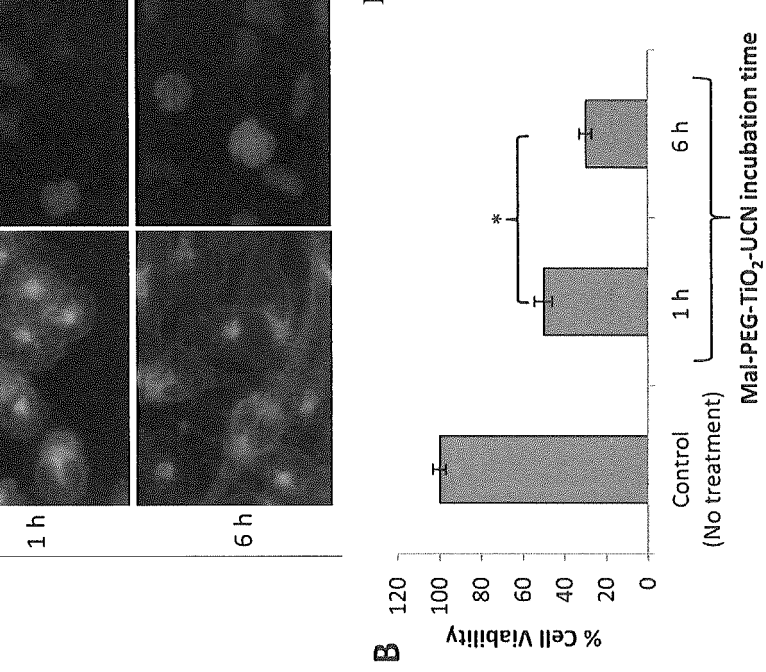


FIG. 19B

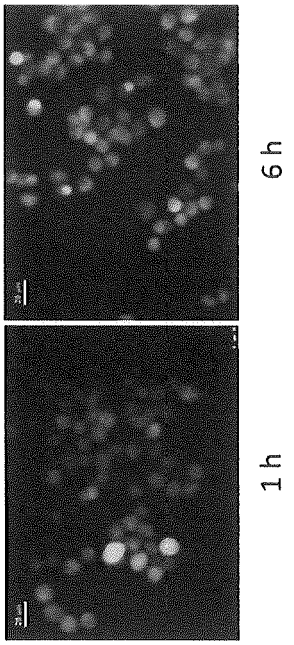


FIG. 19C