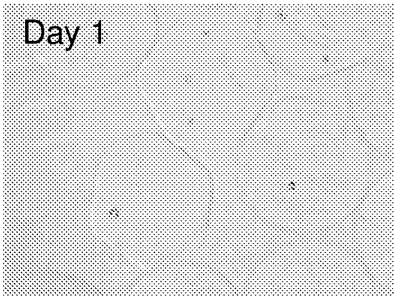


FIG. 1A

FIG. 1B

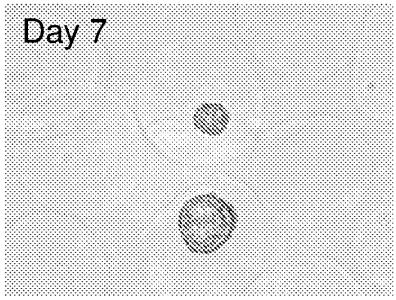


FIG. 1C

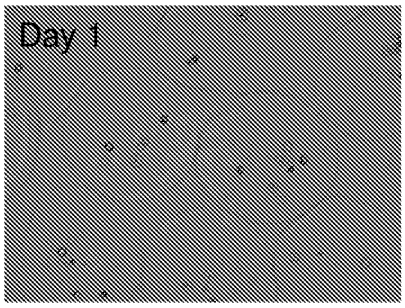


FIG. 2A

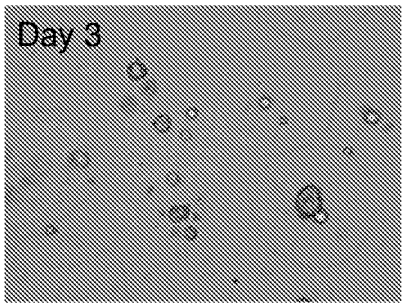


FIG. 2B

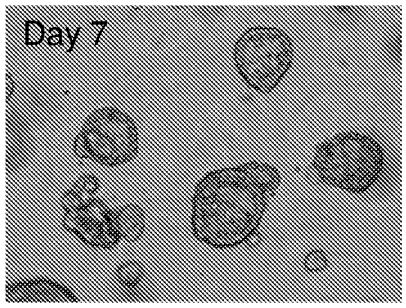


FIG. 2C

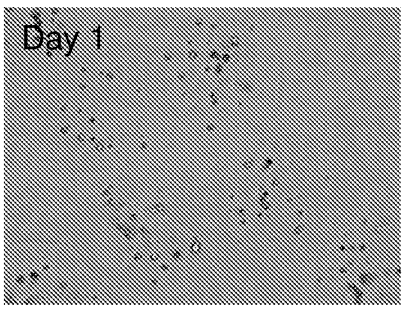


FIG. 3A

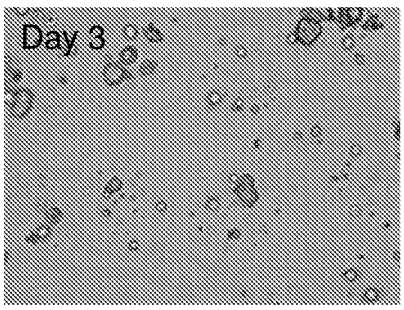


FIG. 3B

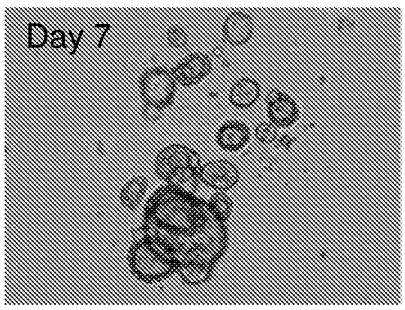


FIG. 3C

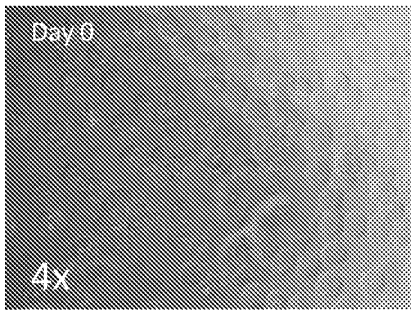


FIG. 4A

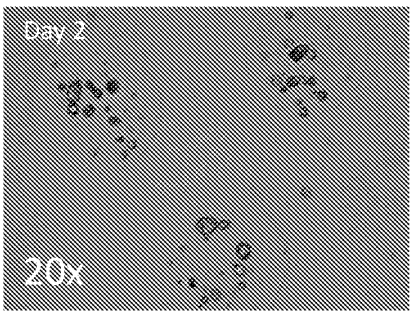


FIG. 4B

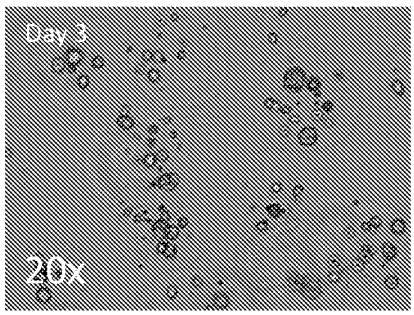


FIG. 4C

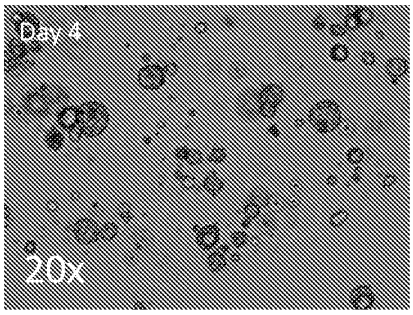


FIG. 4D

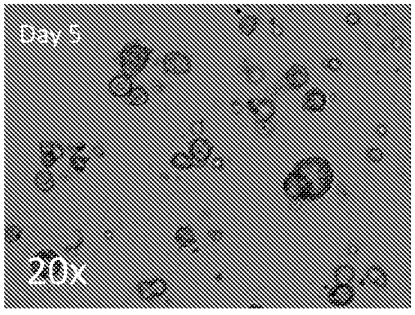


FIG. 4E

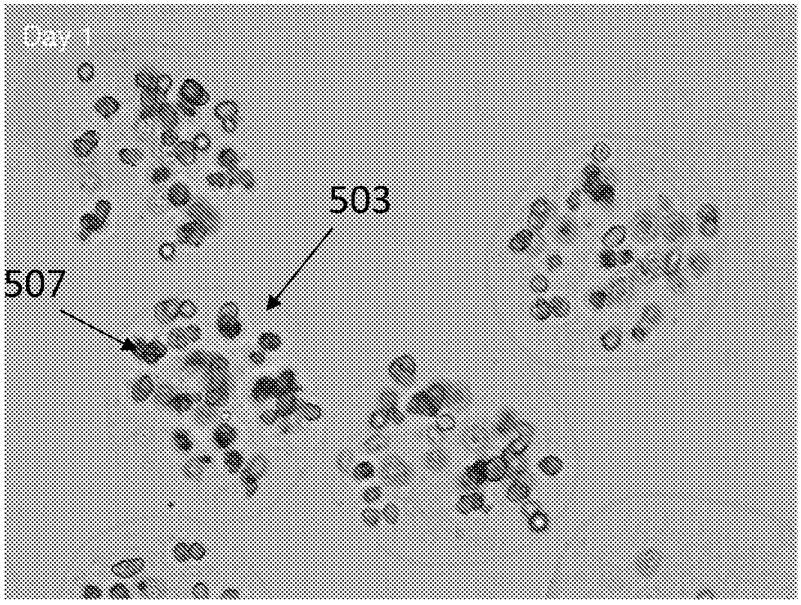


FIG. 5A

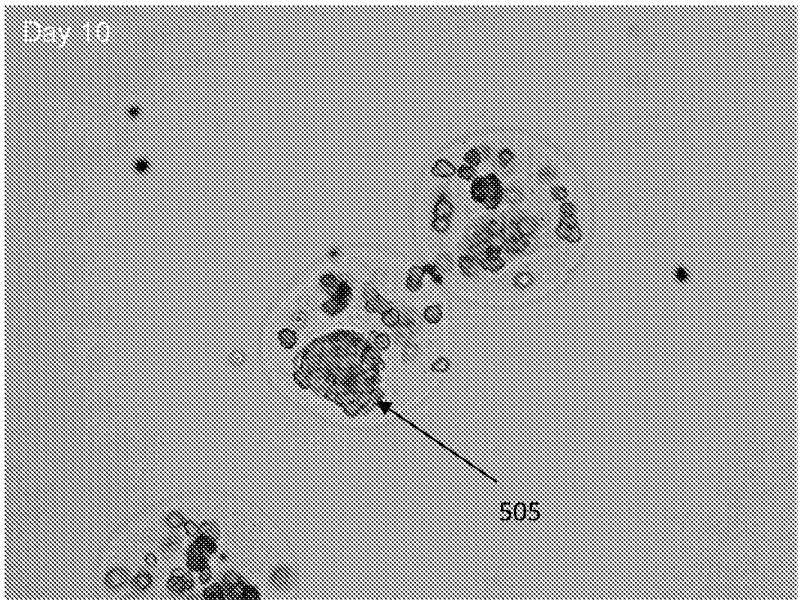


FIG. 5B

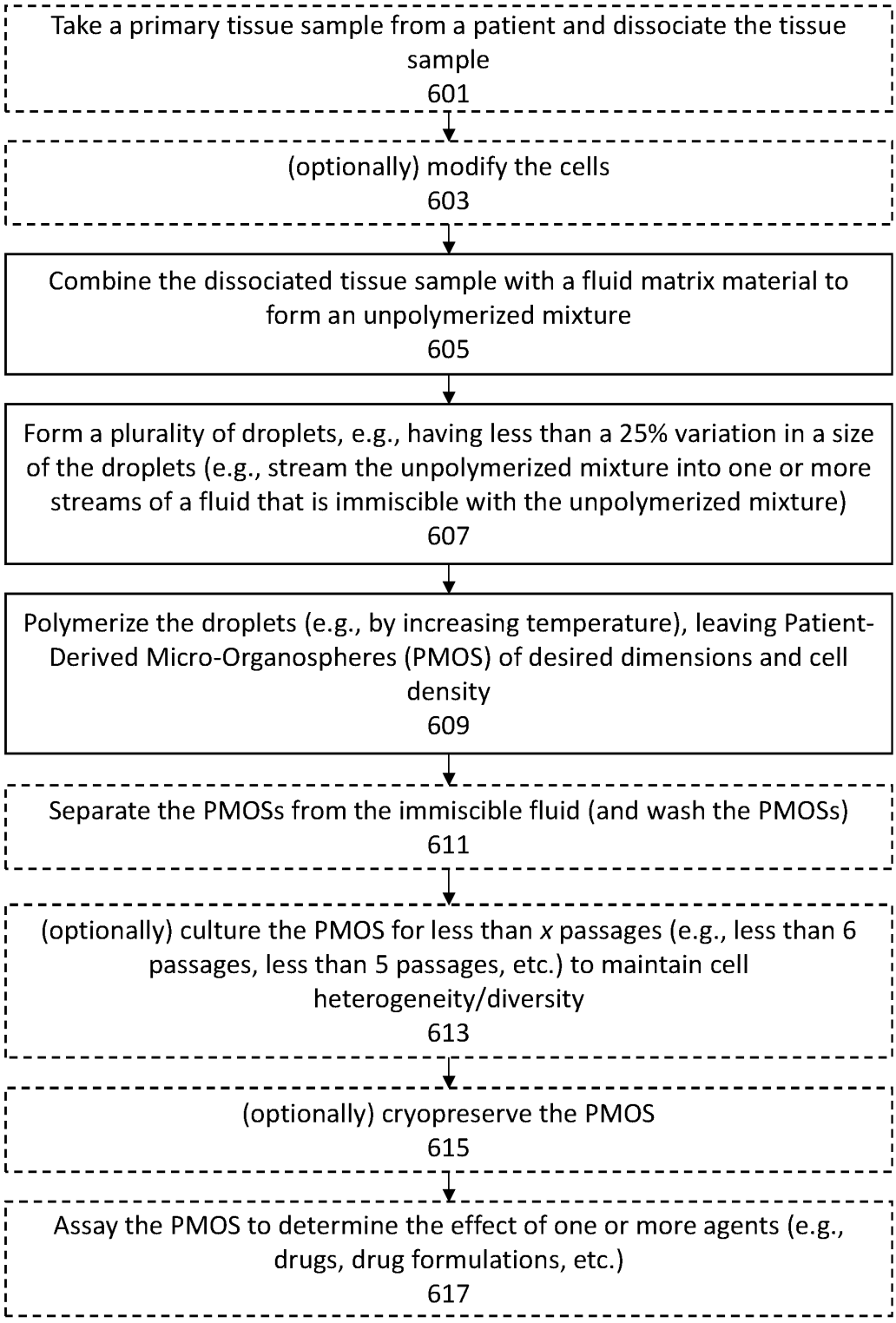

Take a primary tissue sample from a patient and dissociate the tissue sample
601
(optionally) modify the cells
603
Combine the dissociated tissue sample with a fluid matrix material to form an unpolymerized mixture
605
Form a plurality of droplets, e.g., having less than a 25% variation in a size of the droplets (e.g., stream the unpolymerized mixture into one or more streams of a fluid that is immiscible with the unpolymerized mixture)
607
Polymerize the droplets (e.g., by increasing temperature), leaving Patient-Derived Micro-Organospheres (PMOS) of desired dimensions and cell density
609
Separate the PMOSs from the immiscible fluid (and wash the PMOSs)
611
(optionally) culture the PMOS for less than x passages (e.g., less than 6 passages, less than 5 passages, etc.) to maintain cell heterogeneity/diversity
613
(optionally) cryopreserve the PMOS
615
Assay the PMOS to determine the effect of one or more agents (e.g., drugs, drug formulations, etc.)
617

FIG. 6

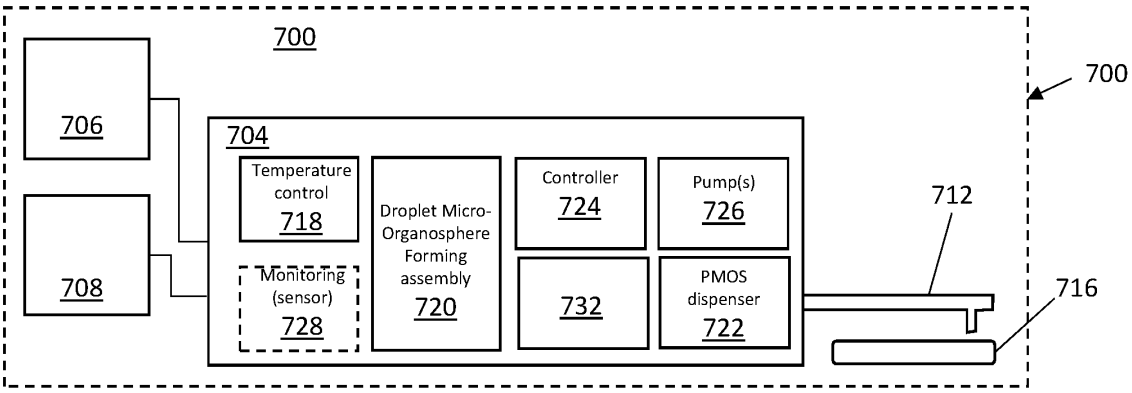


FIG. 7A

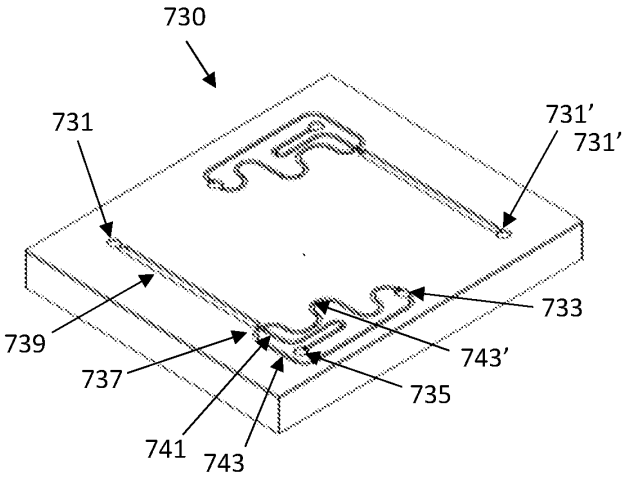


FIG. 7B

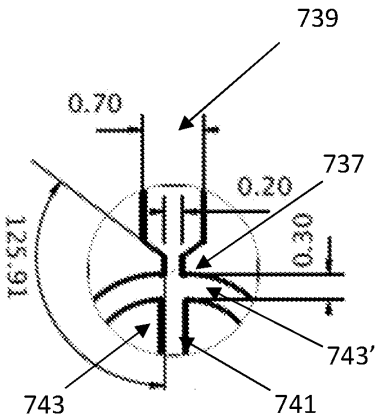


FIG. 7C

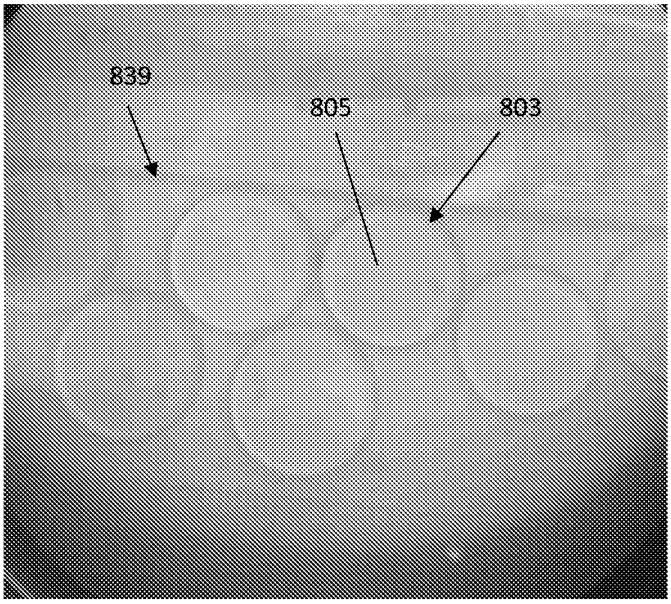


FIG. 8

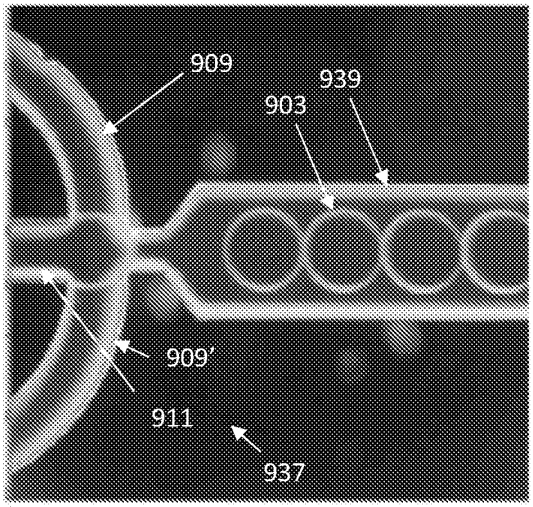


FIG. 9

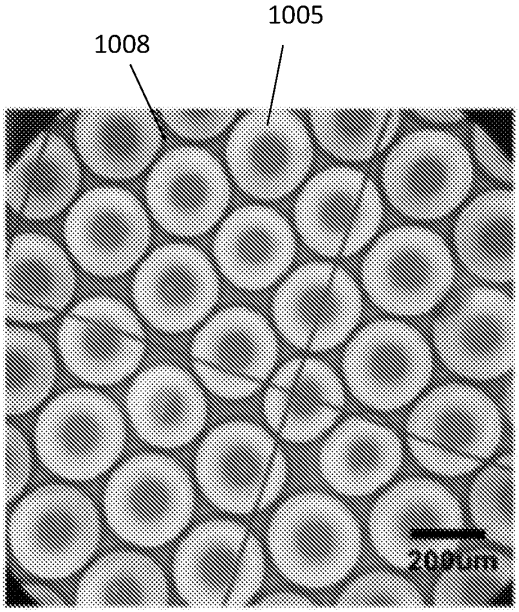


FIG. 10

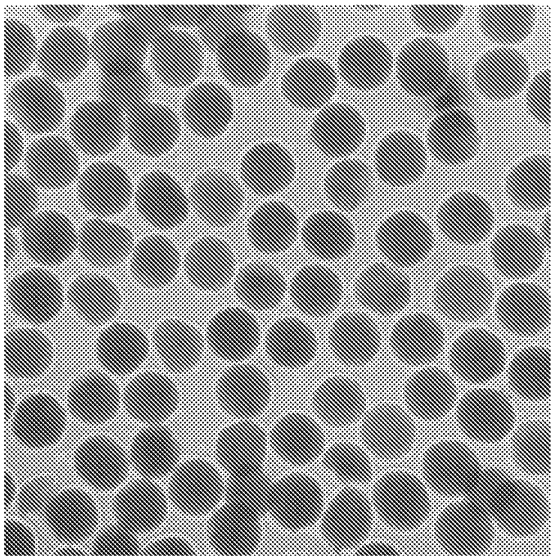


FIG. 11A

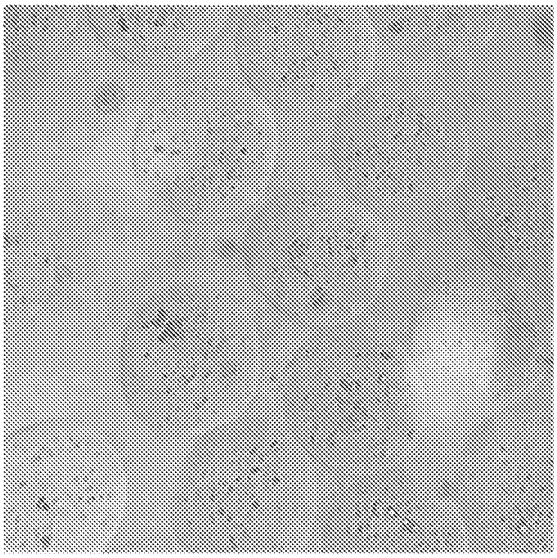


FIG. 11B

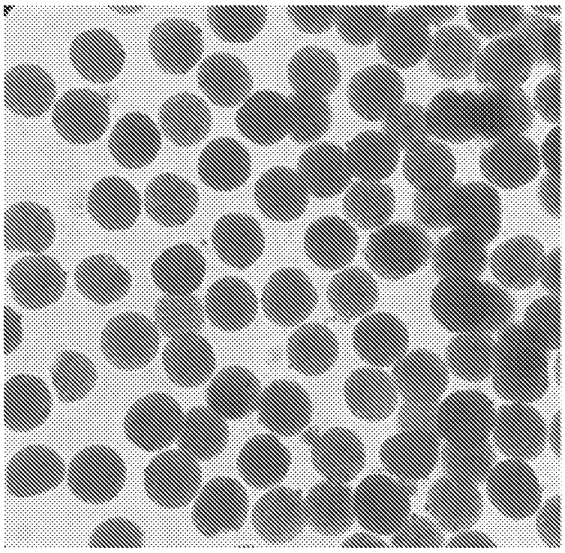


FIG. 12A

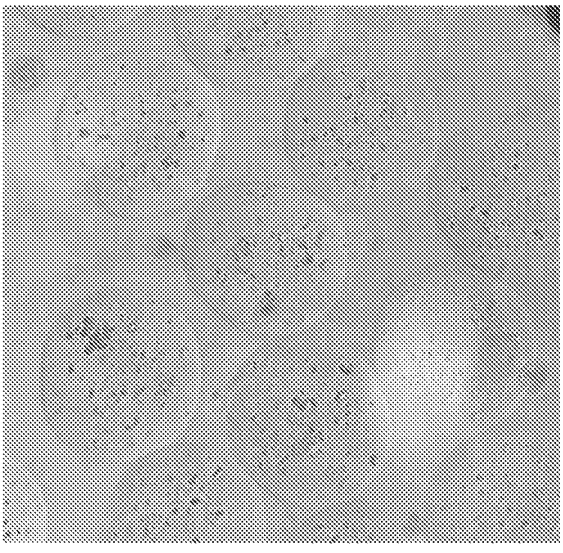


FIG. 12B

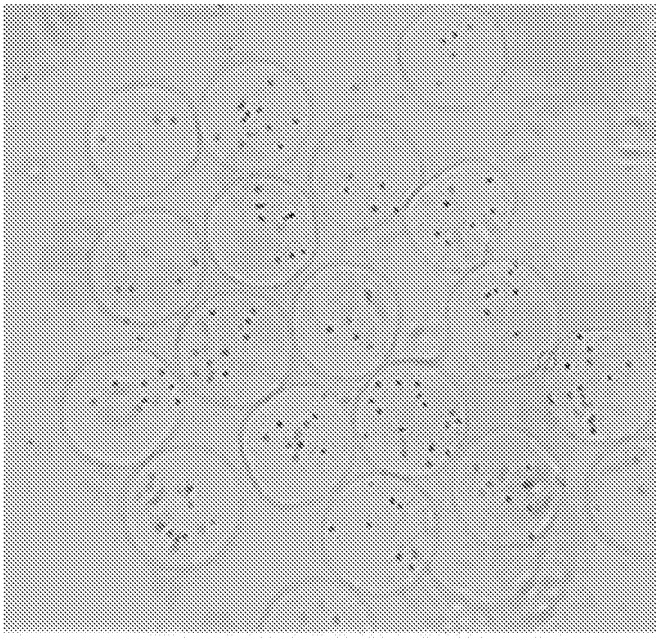


FIG. 13

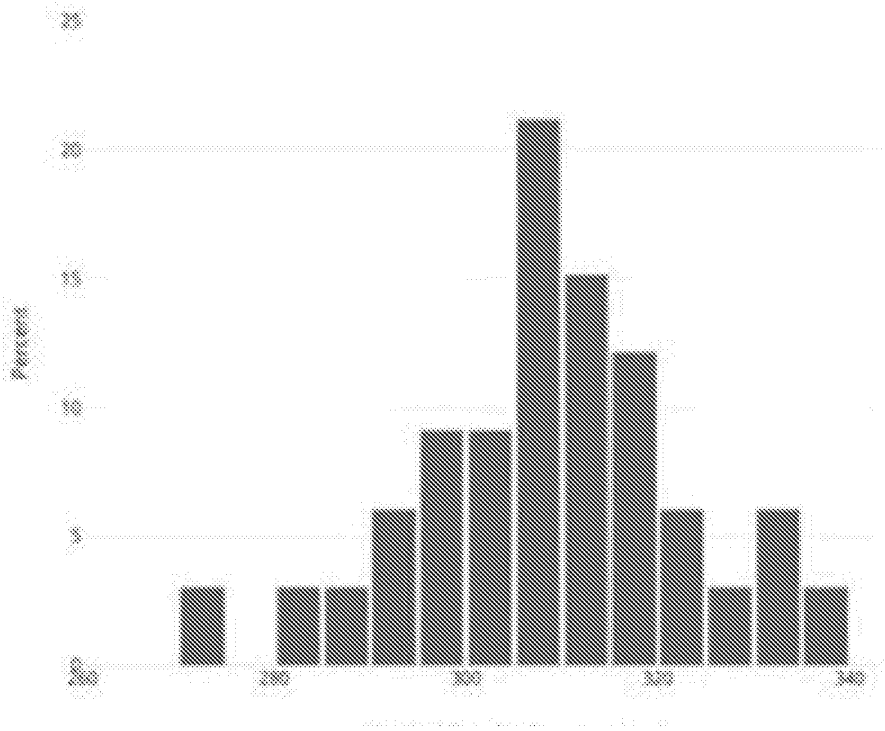


FIG. 14

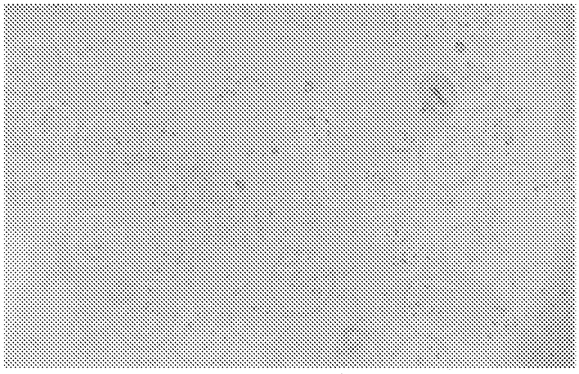


FIG. 15A

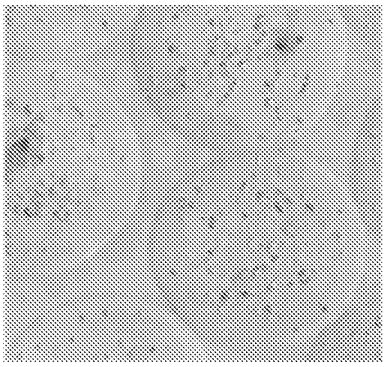


FIG. 15B

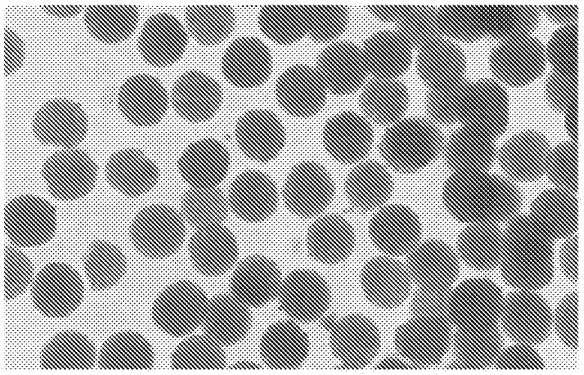


FIG. 16A

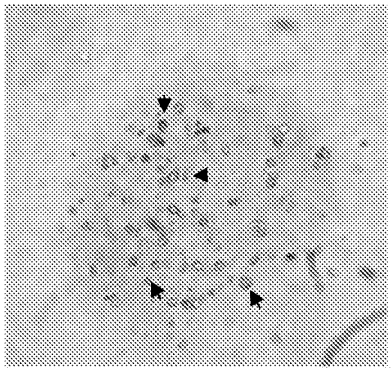
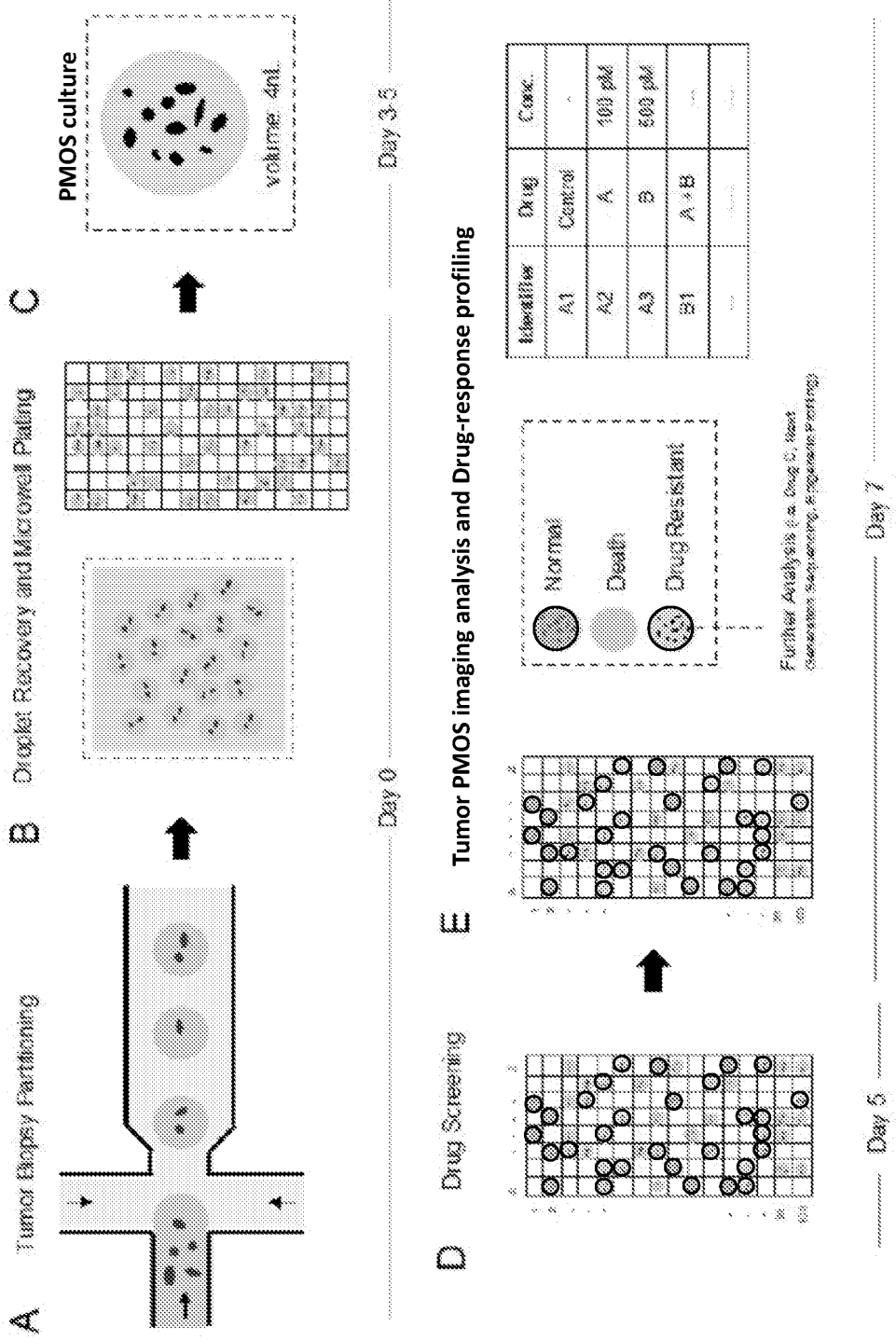


FIG. 16B


A
Tumor Biopsy Partitioning
B
Droplet Recovery and Microwell Plating
C
PMOS culture
volume 4nL
Day 0
Day 3-5
D
Drug Screening
E
Tumor PMOS imaging analysis and Drug-response profiling
Normal
Death
Drug Resistant
Identifier
Drug
Conc.
A1
Control
A2
A
100 pM
A3
B
500 pM
B1
A + B
Day 5
Day 7

FIGS. 17A-17E

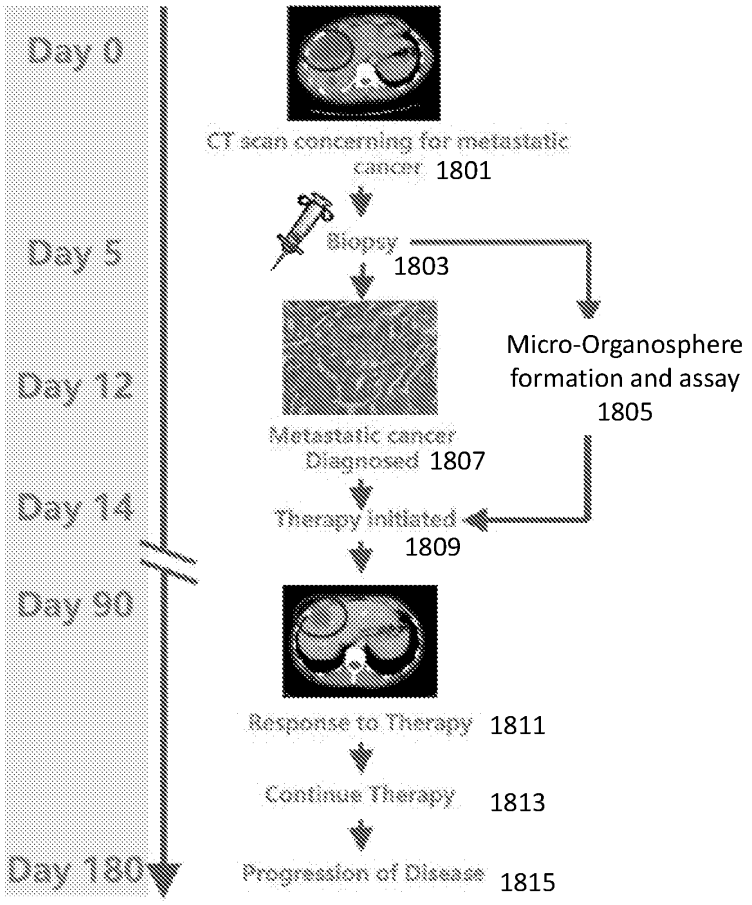

Day 0
CT scan concerning for metastatic cancer 1801
Day 5
Biopsy 1803
Micro-Organosphere formation and assay 1805
Day 12
Metastatic cancer Diagnosed 1807
Day 14
Therapy Initiated 1809
Day 90
Response to Therapy 1811
Continue Therapy 1813
Day 180
Progression of Disease 1815

FIG. 18

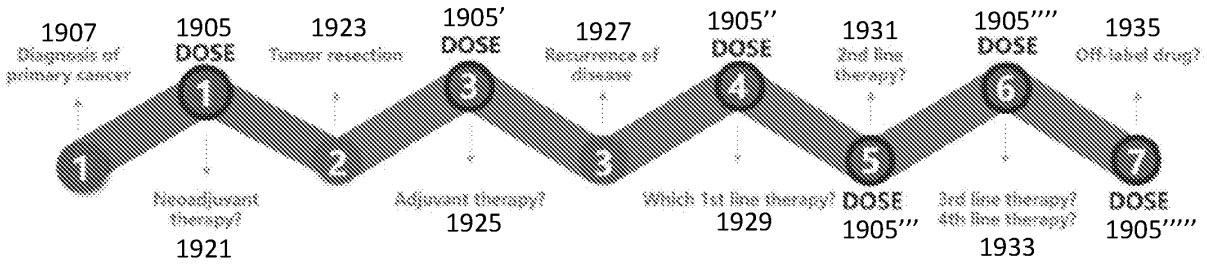

1907
Diagnosis of primary cancer
1905
DOSE
1923
Tumor resection
1905'
DOSE
1927
Recurrence of disease
1905''
DOSE
1931
2nd line therapy?
1905''''
DOSE
1935
Off-label drug?
1
2
3
4
5
6
7
Neoadjuvant therapy?
1921
Adjuvant therapy?
1925
Which 1st line therapy?
1929
DOSE
1905'''
3rd line therapy? 4th line therapy?
1933
DOSE
1905'''''

FIG. 19

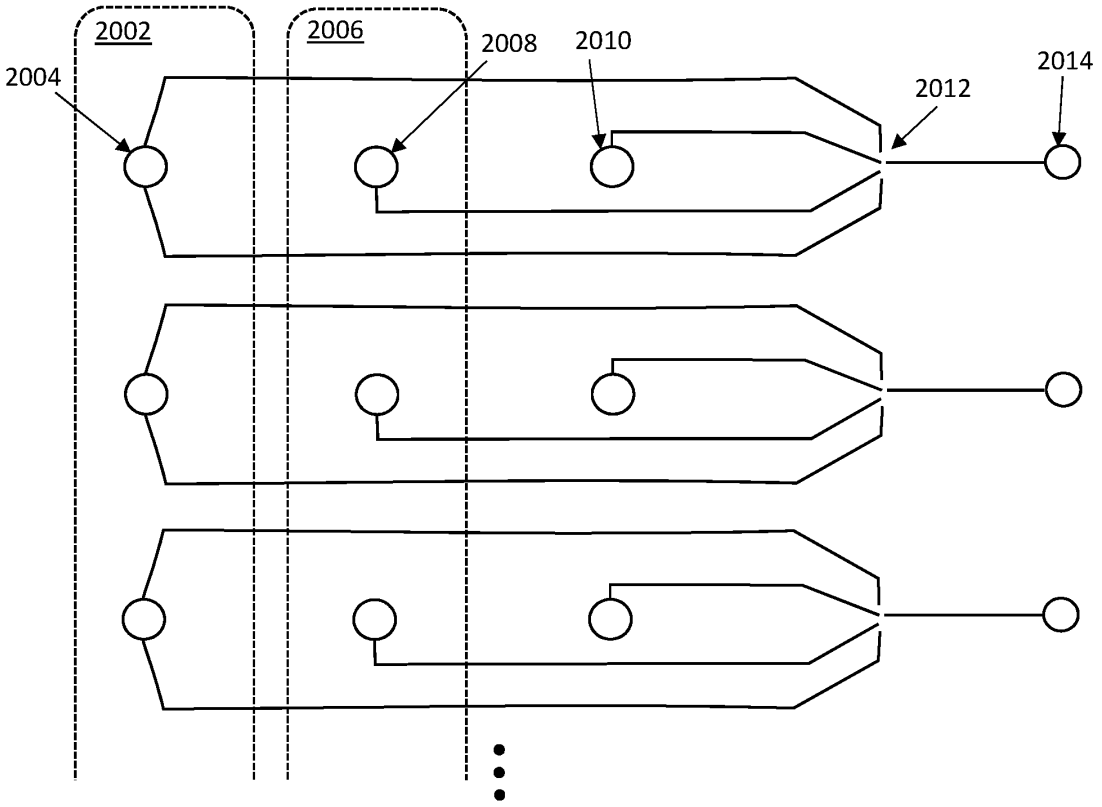


FIG. 20

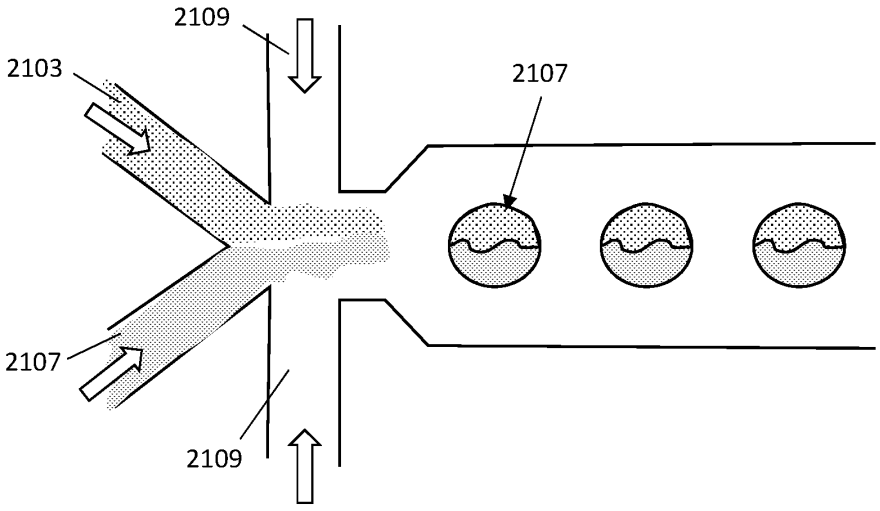


FIG. 21

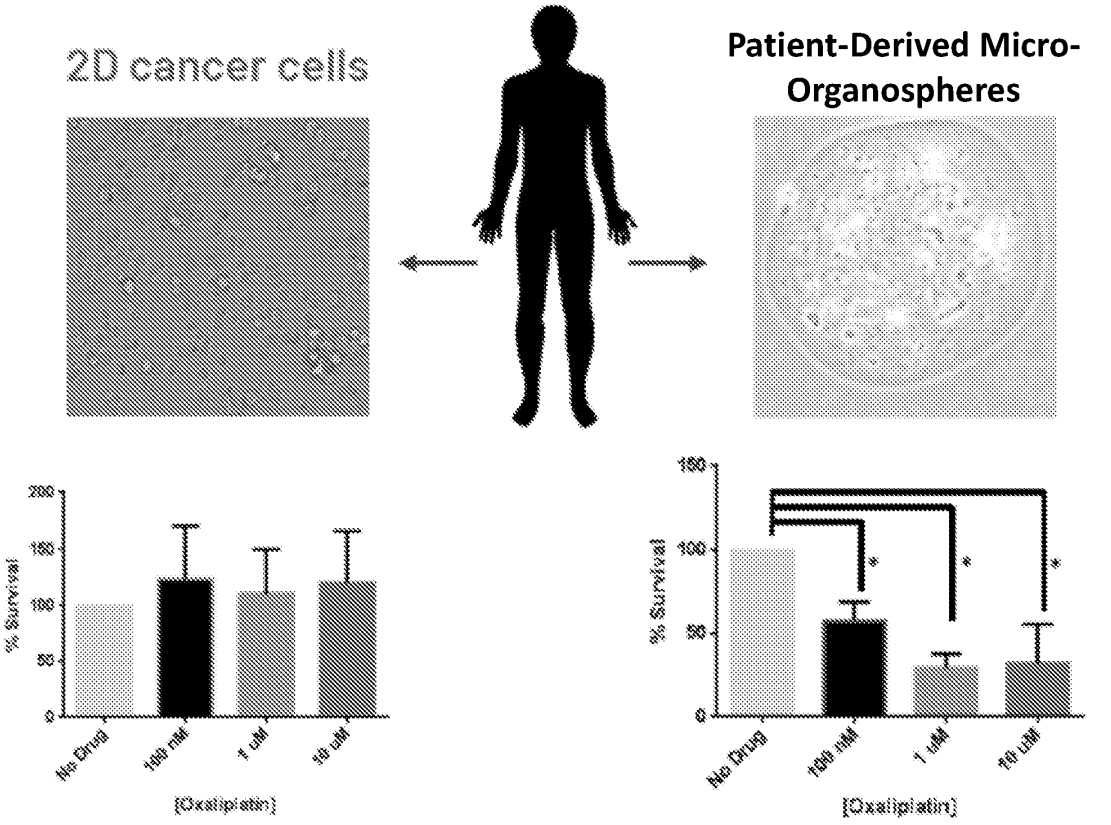


FIG. 22A FIG. 22B

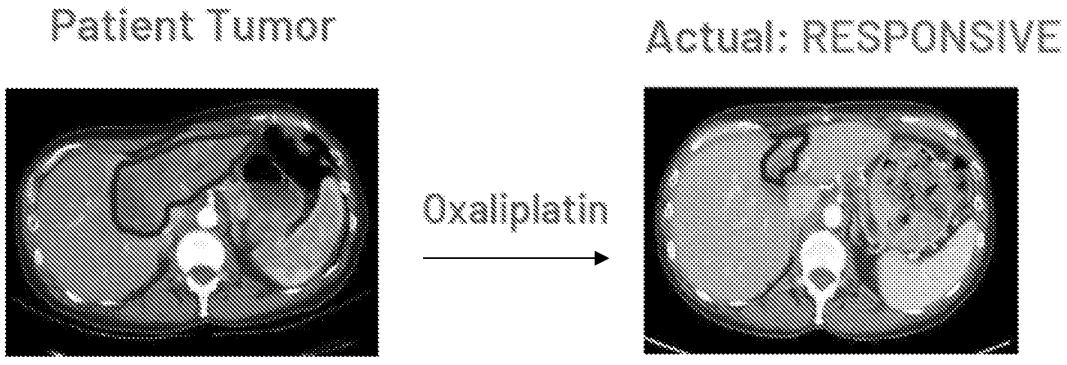


FIG. 22C FIG. 22D

Patient-Derived Micro-Organospheres

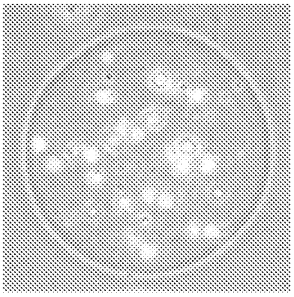


FIG. 23A

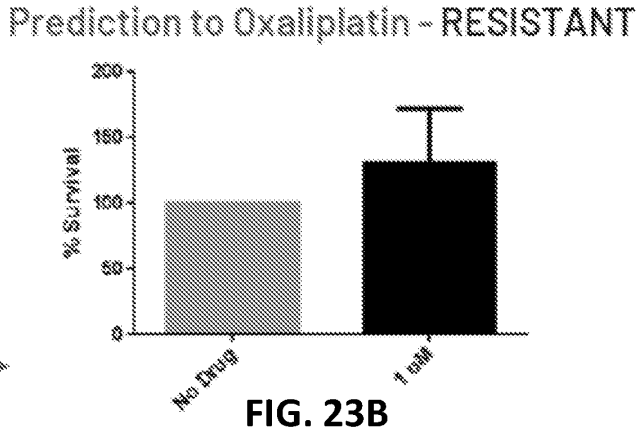


FIG. 23B

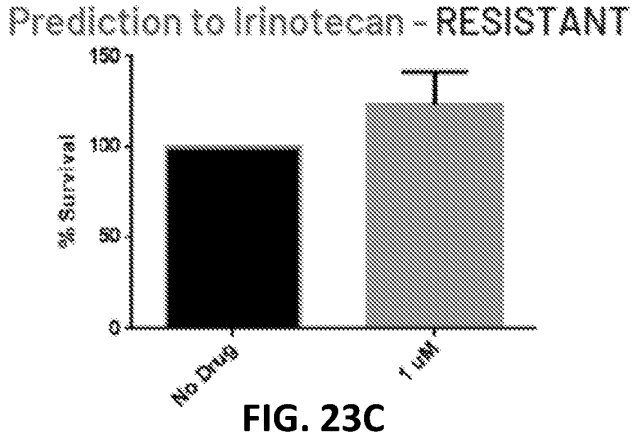
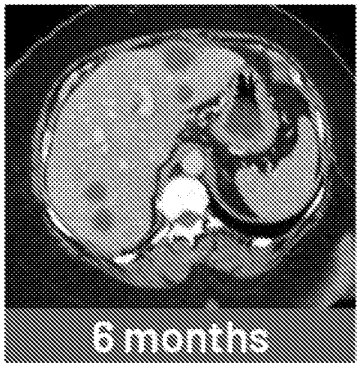


FIG. 23C

Patient treated with
Oxaliplatin and Irinotecan



Actual Response :
NOT RESPONSIVE

FIG. 23D

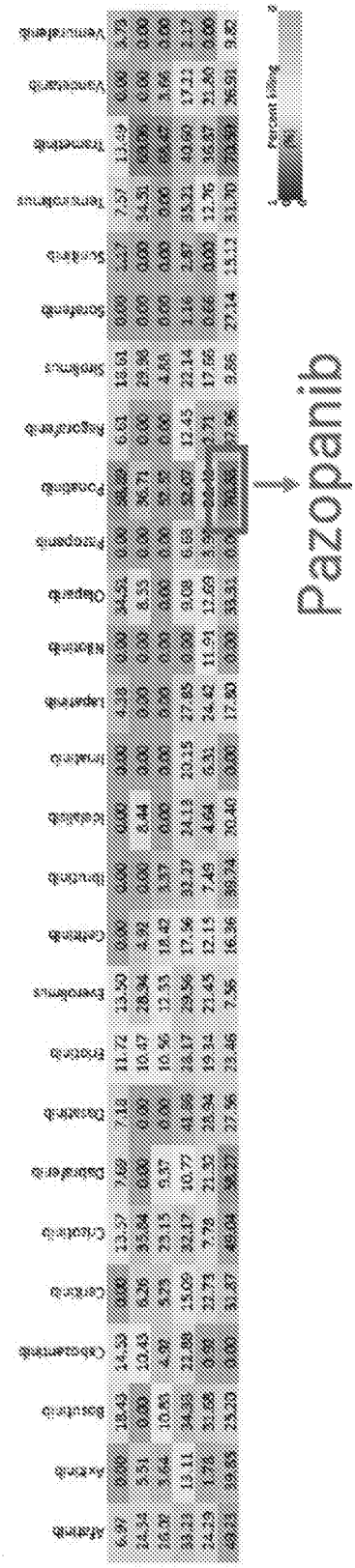


FIG. 24

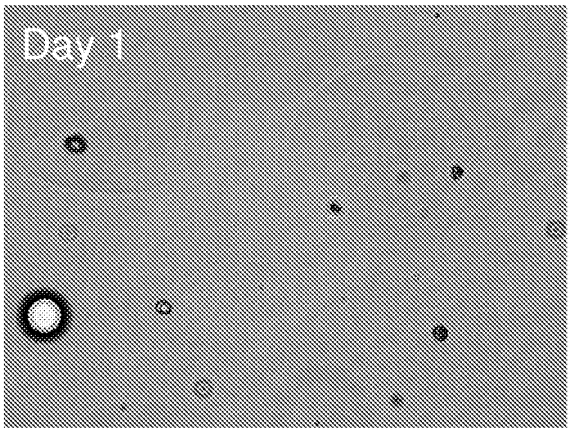


FIG. 25A

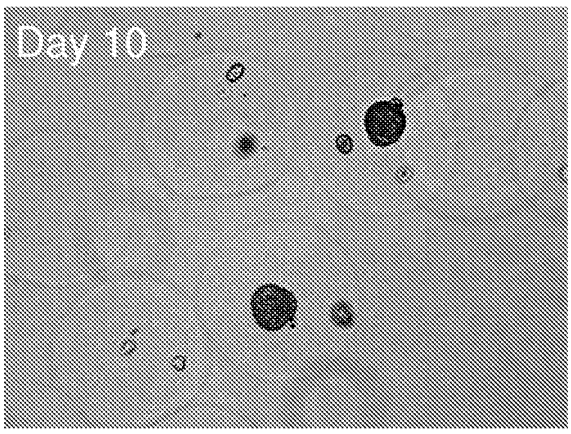


FIG. 25B

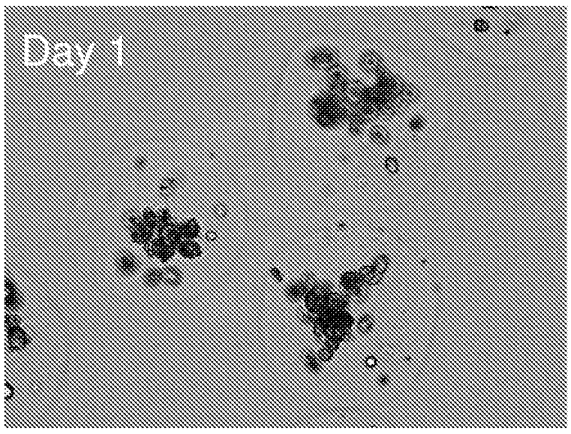


FIG. 26A

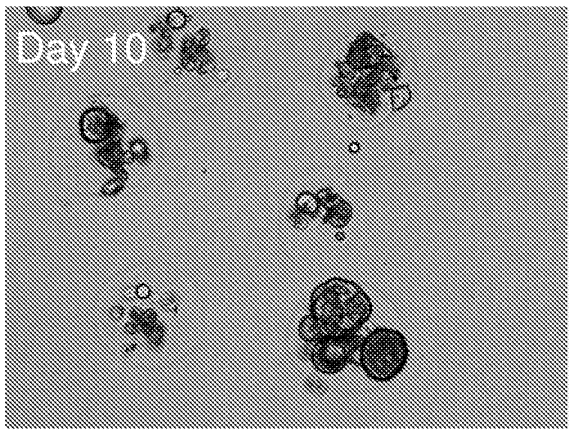


FIG. 26B

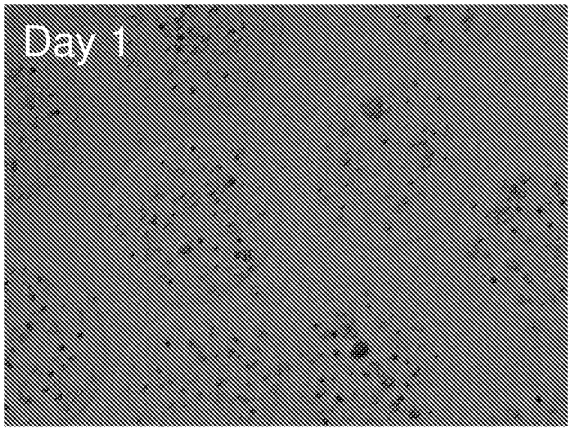


FIG. 27A

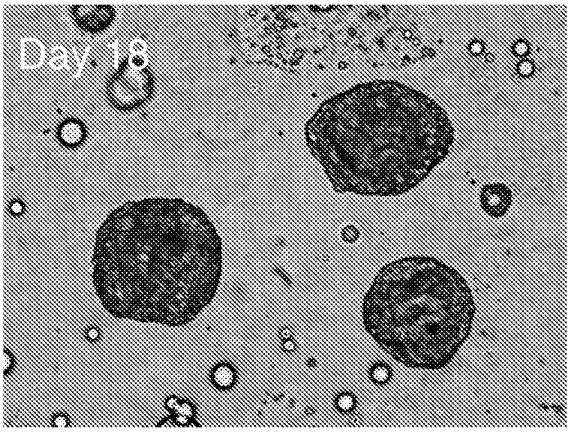


FIG. 27B

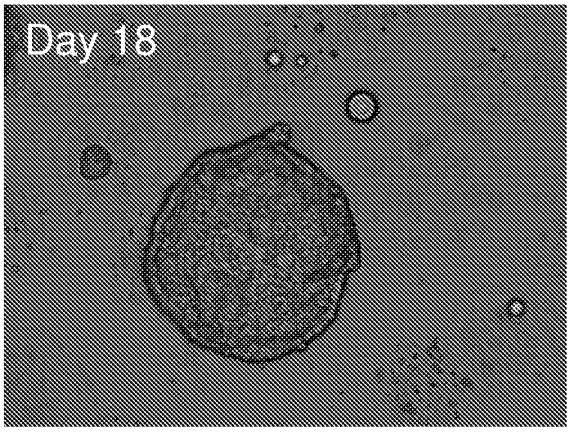


FIG. 27C

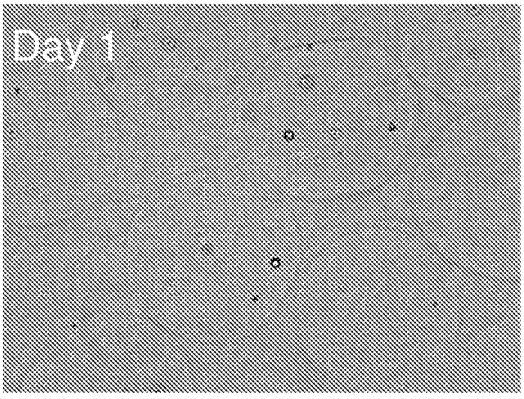


FIG. 28A

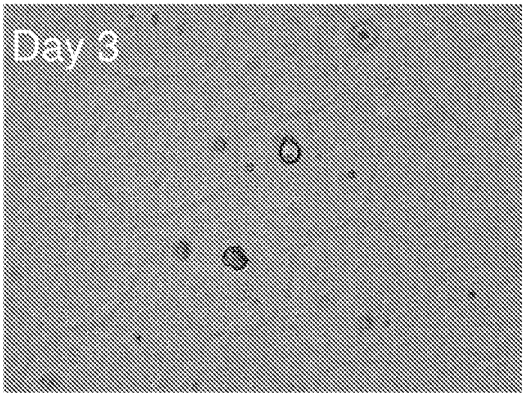


FIG. 28B

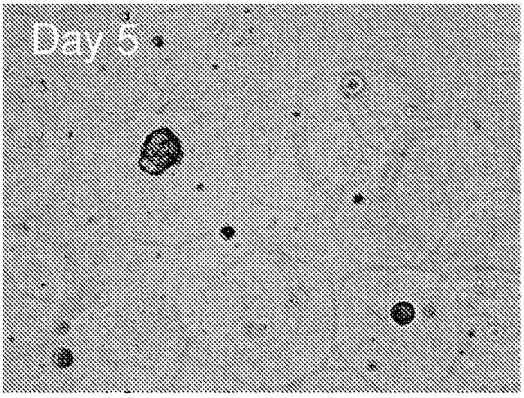


FIG. 28C

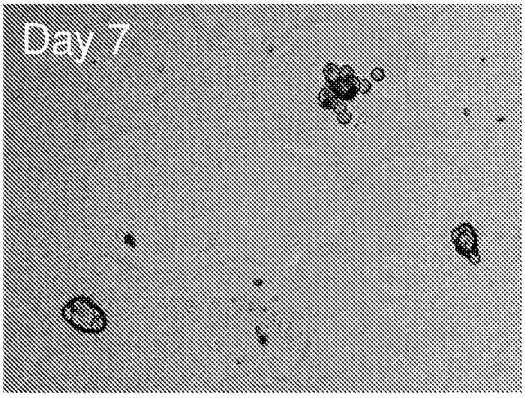


FIG. 28D

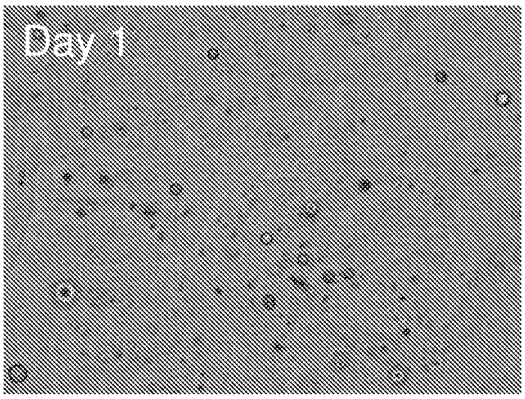


FIG. 29A

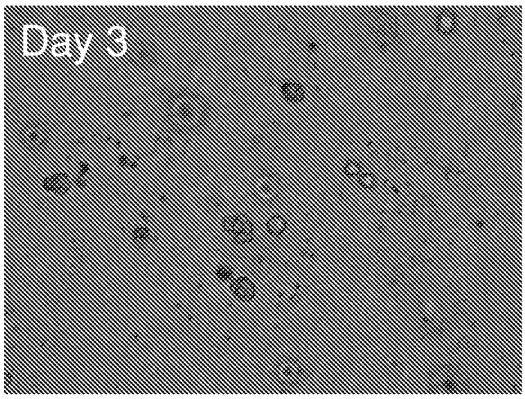


FIG. 29B

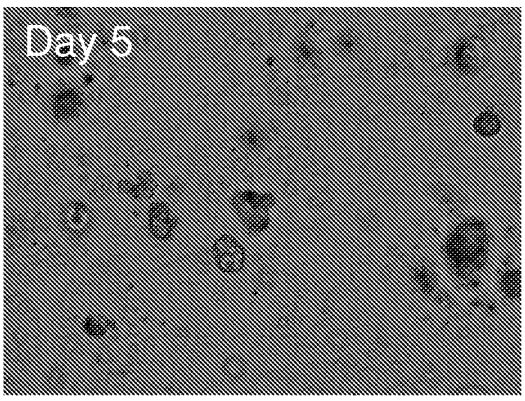


FIG. 29C

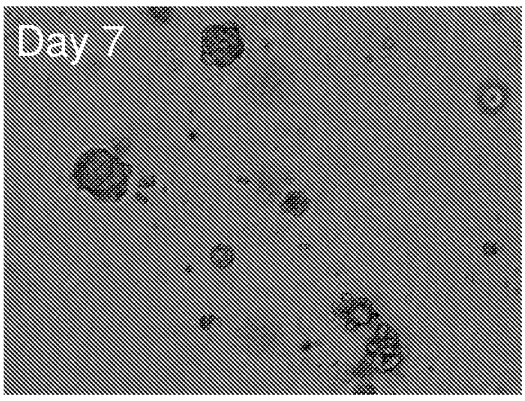


FIG. 29D

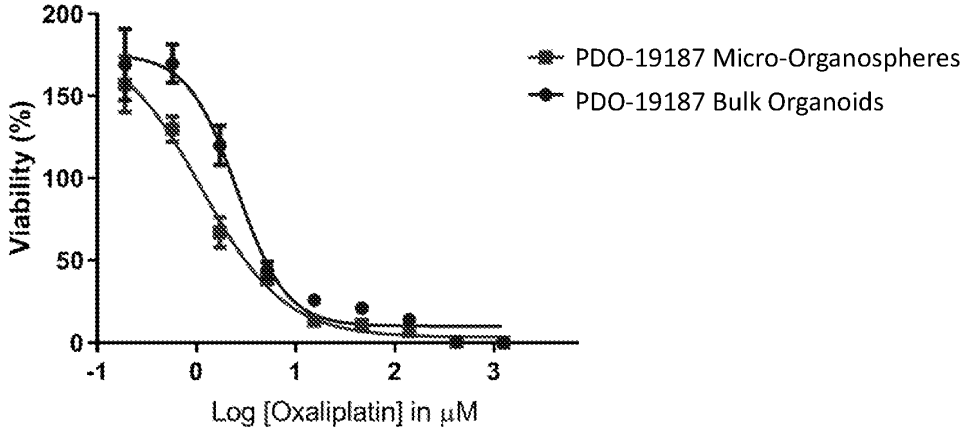


FIG. 30

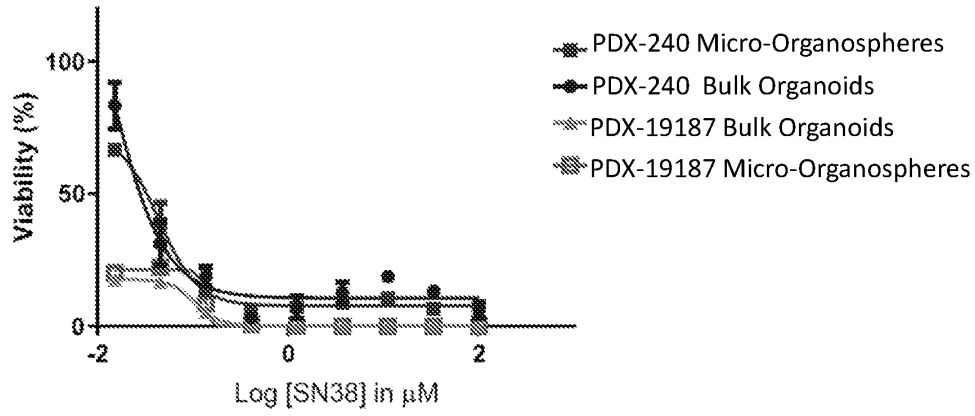


FIG. 31

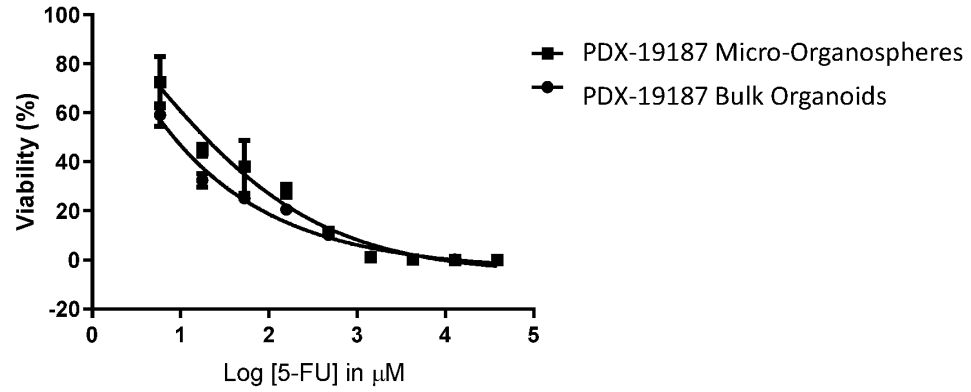


FIG. 32

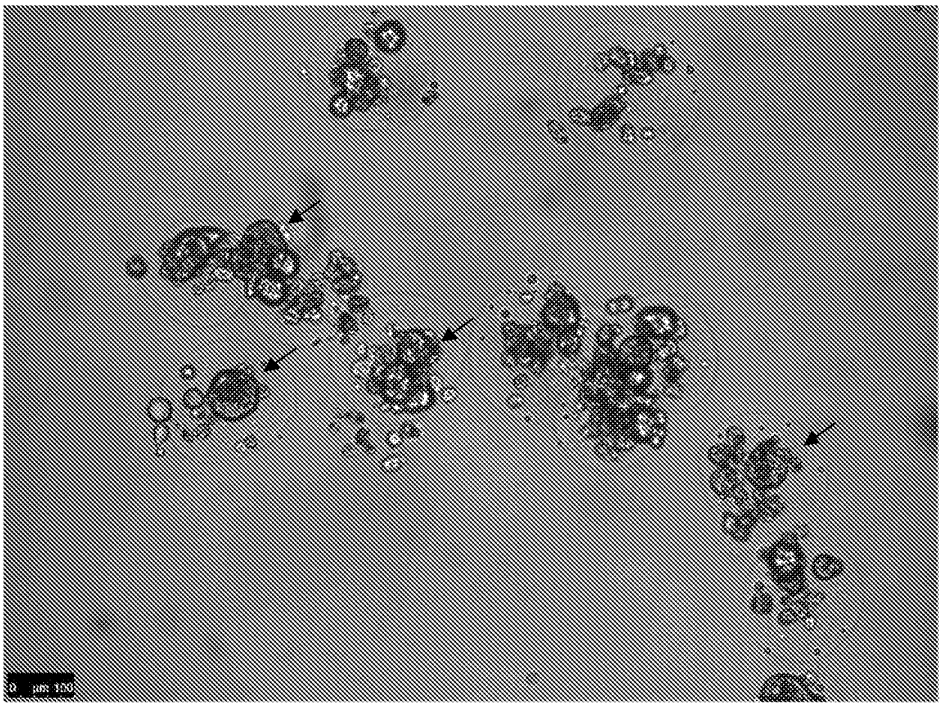


FIG. 33A

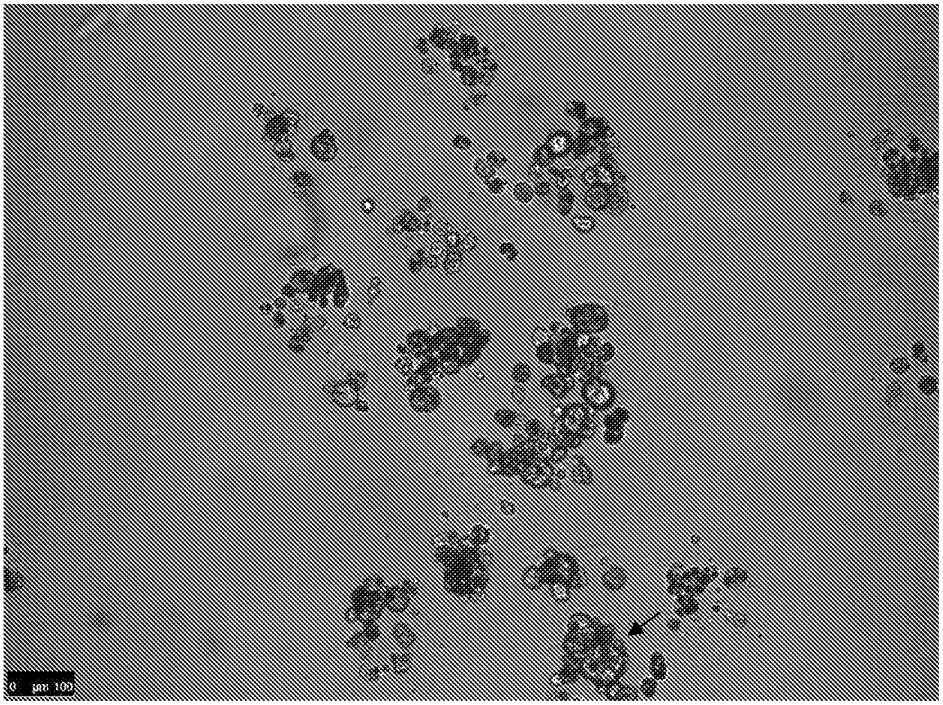


FIG. 33B

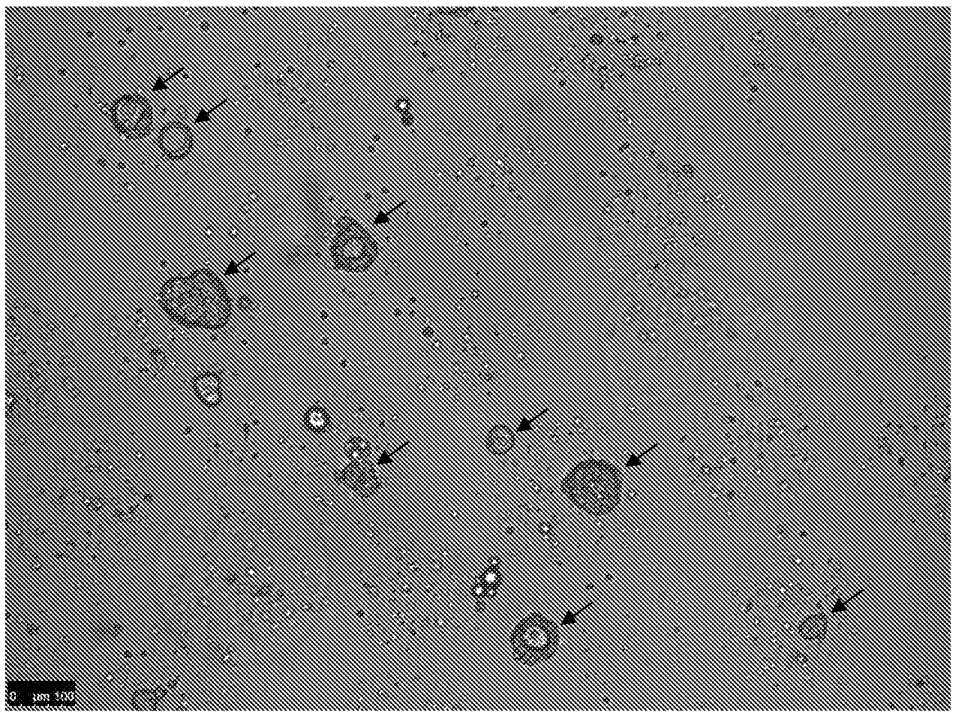


FIG. 34A

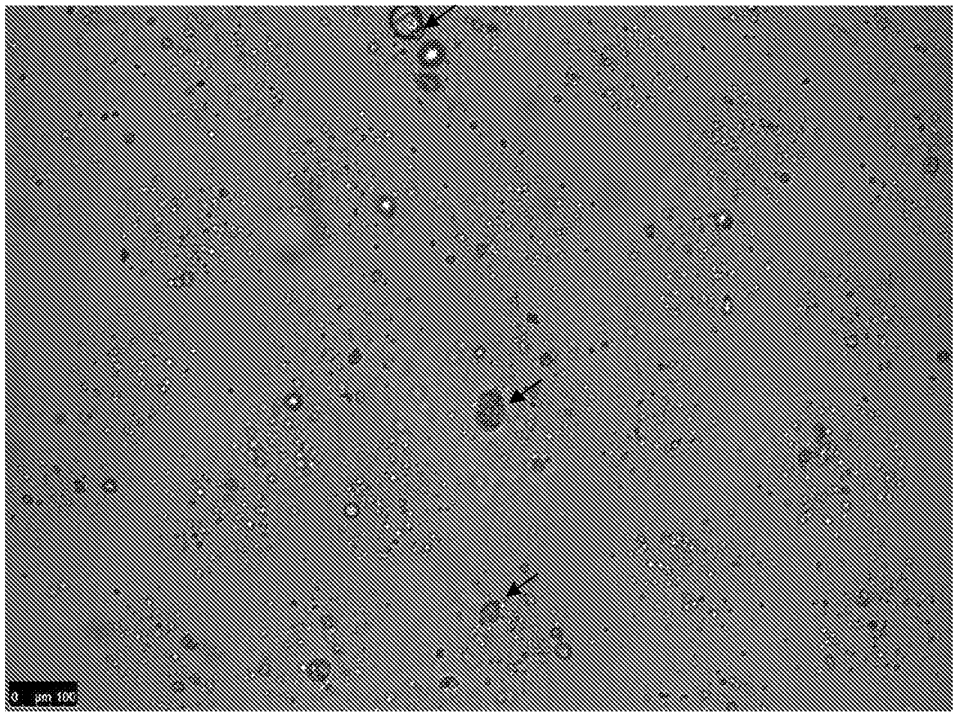


FIG. 34B