

FIG. 1

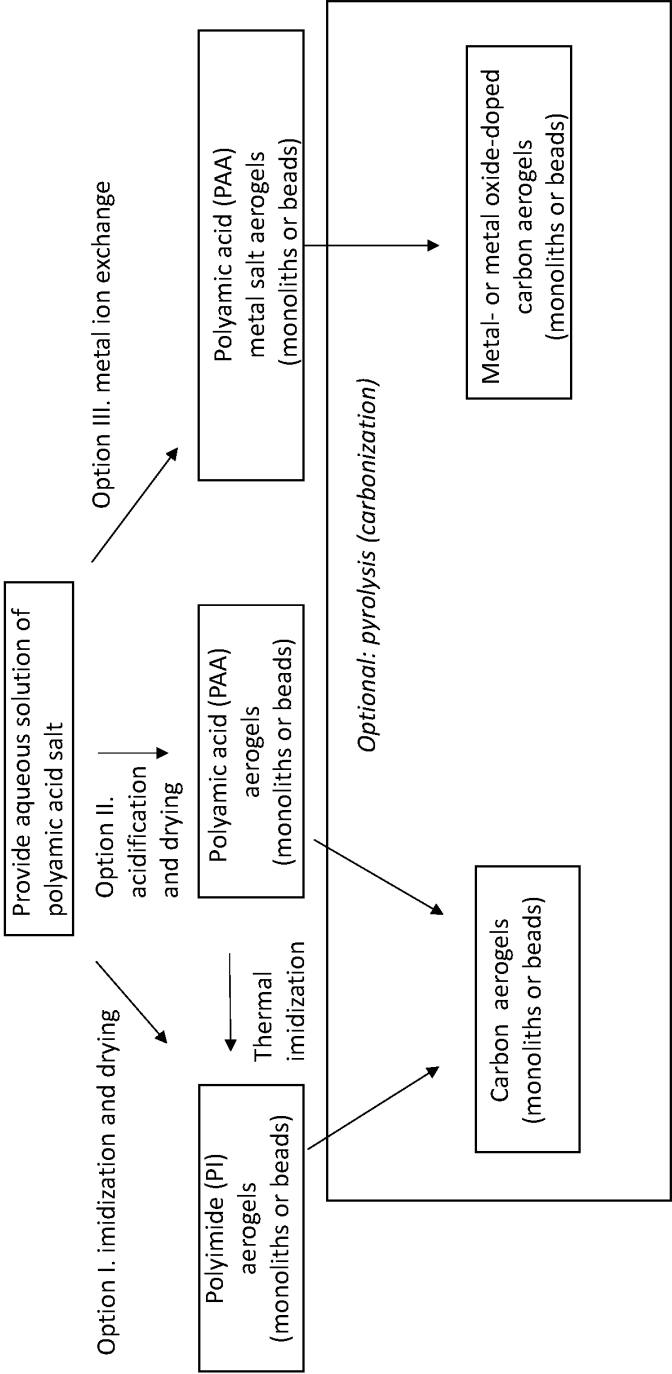


FIG. 2A

Method A (PAA alkali metal salt)

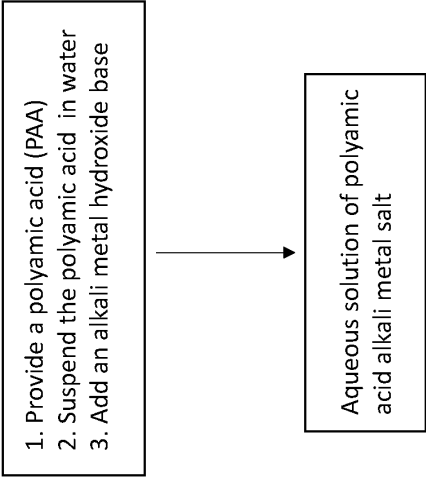


FIG. 2B

Method B (PAA ammonium salt)

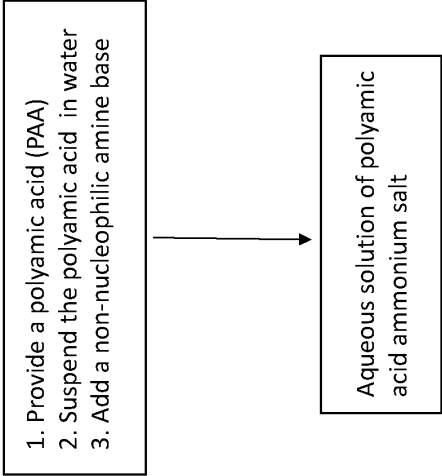


FIG. 2C
Method C (PAA ammonium salt, *in situ* preparation)

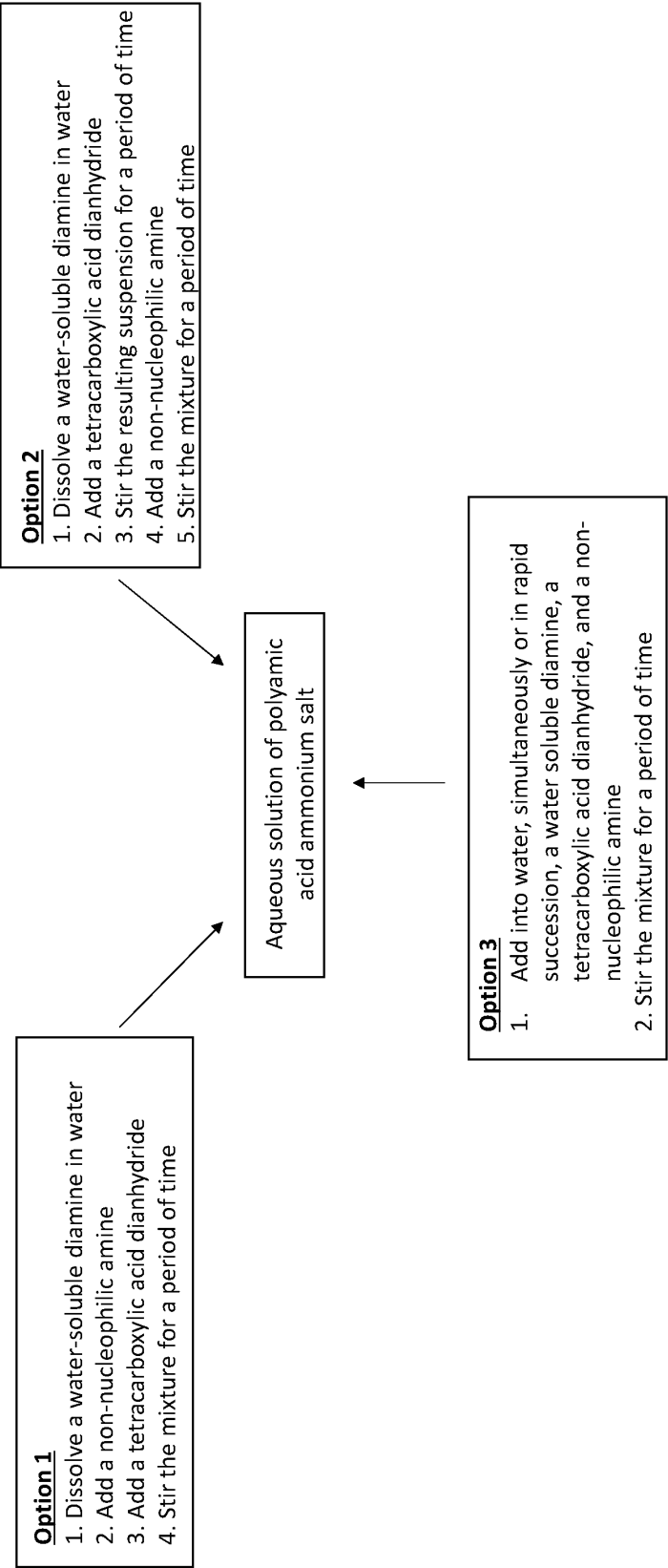


FIG. 3

Polyimide aerogel monoliths (chemical imidization)

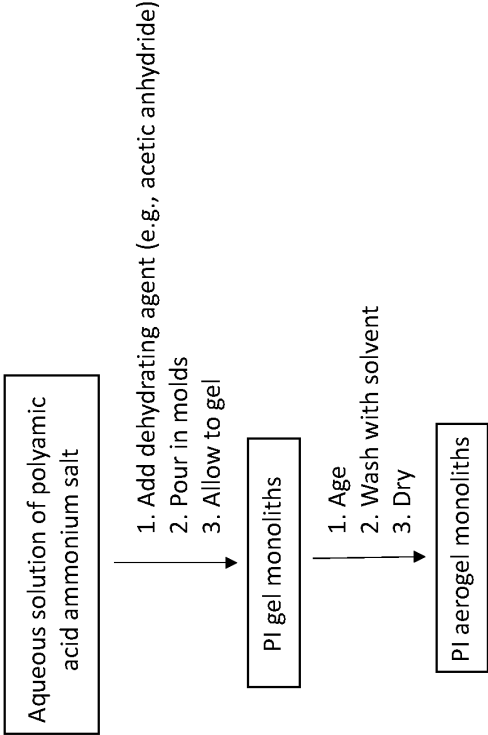


FIG. 4

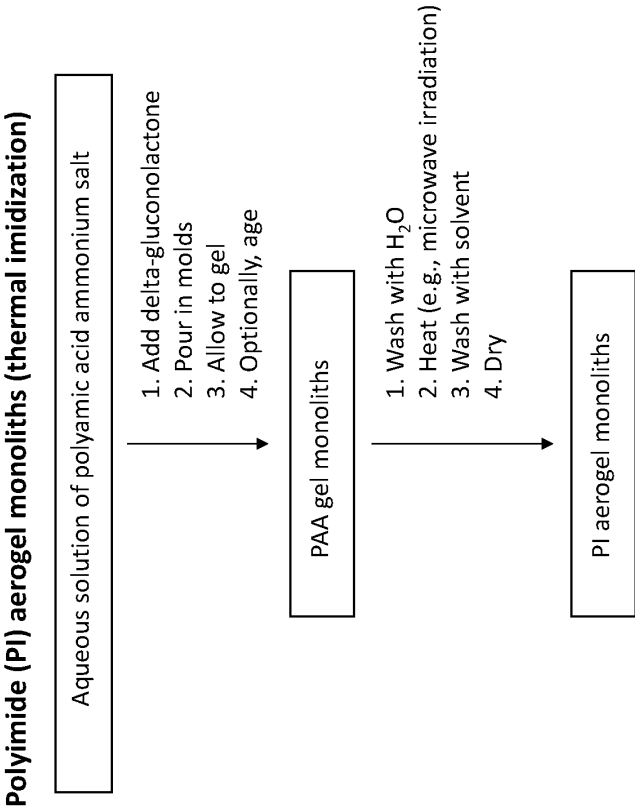


FIG. 5

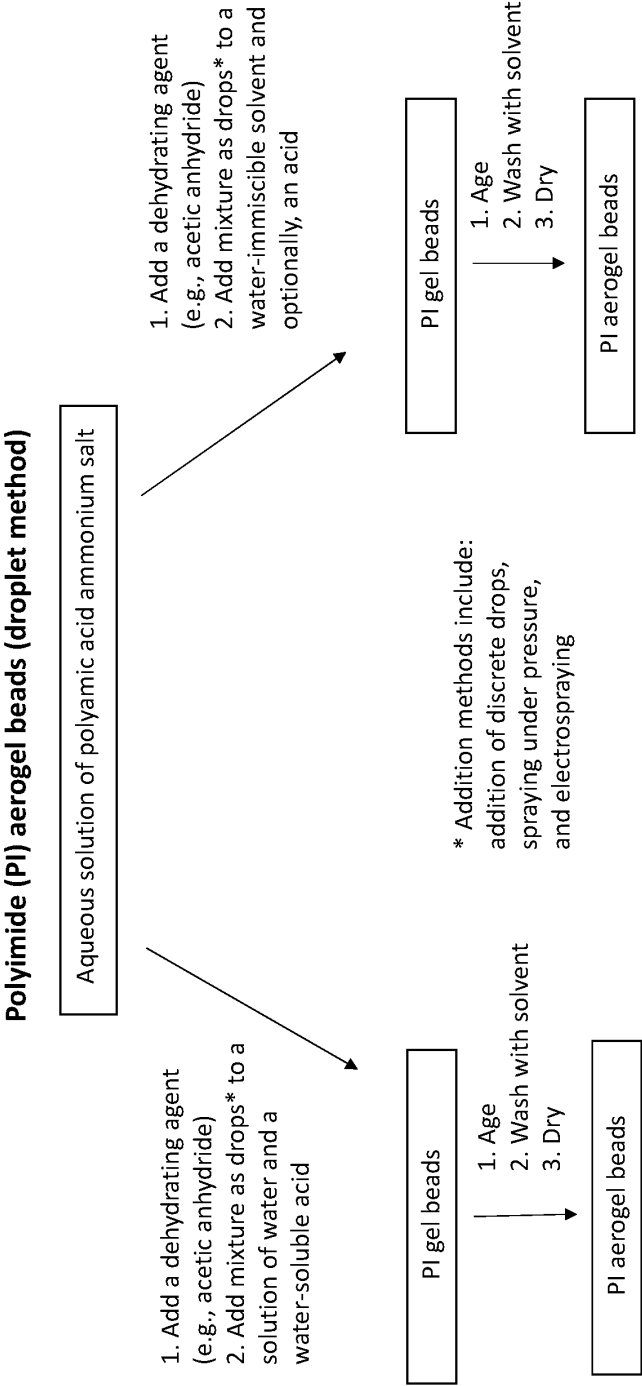


FIG. 6

Polyimide (PI) aerogel microbeads (emulsion method)

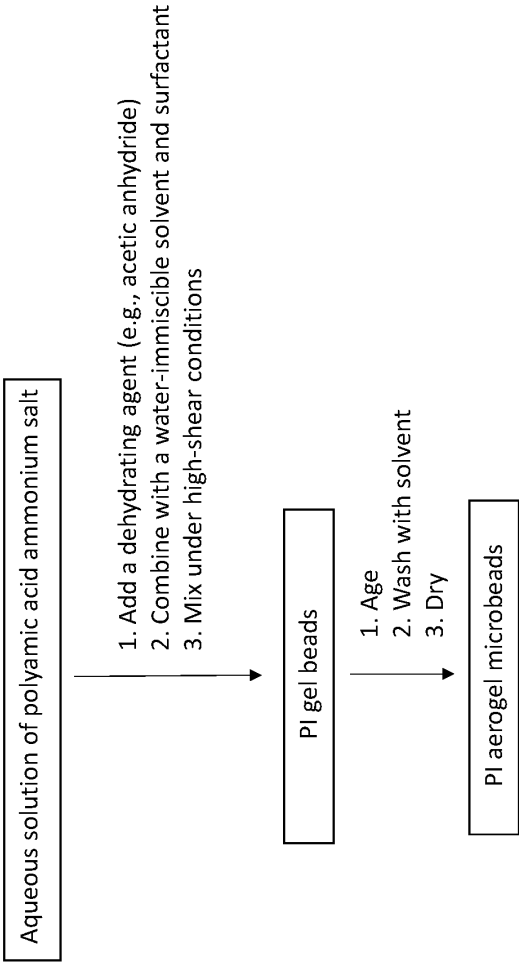


FIG. 7

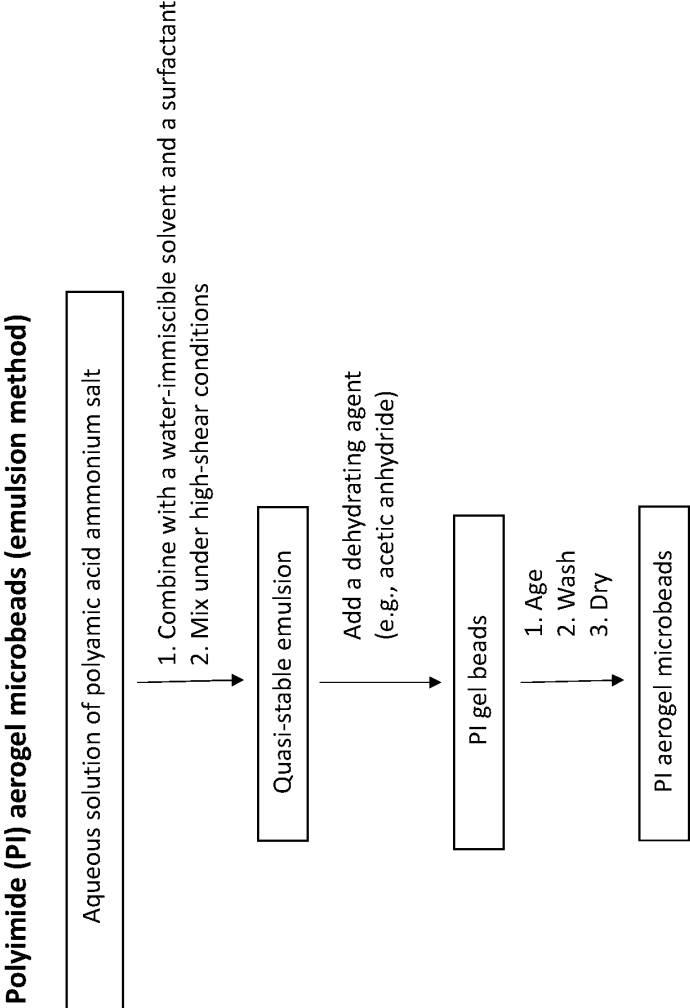
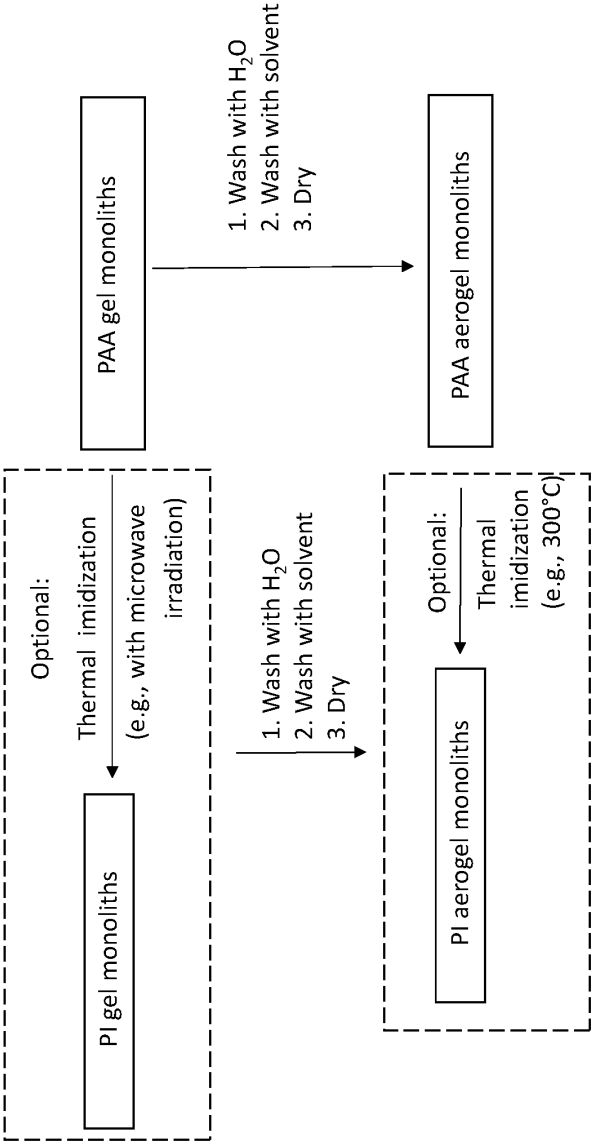
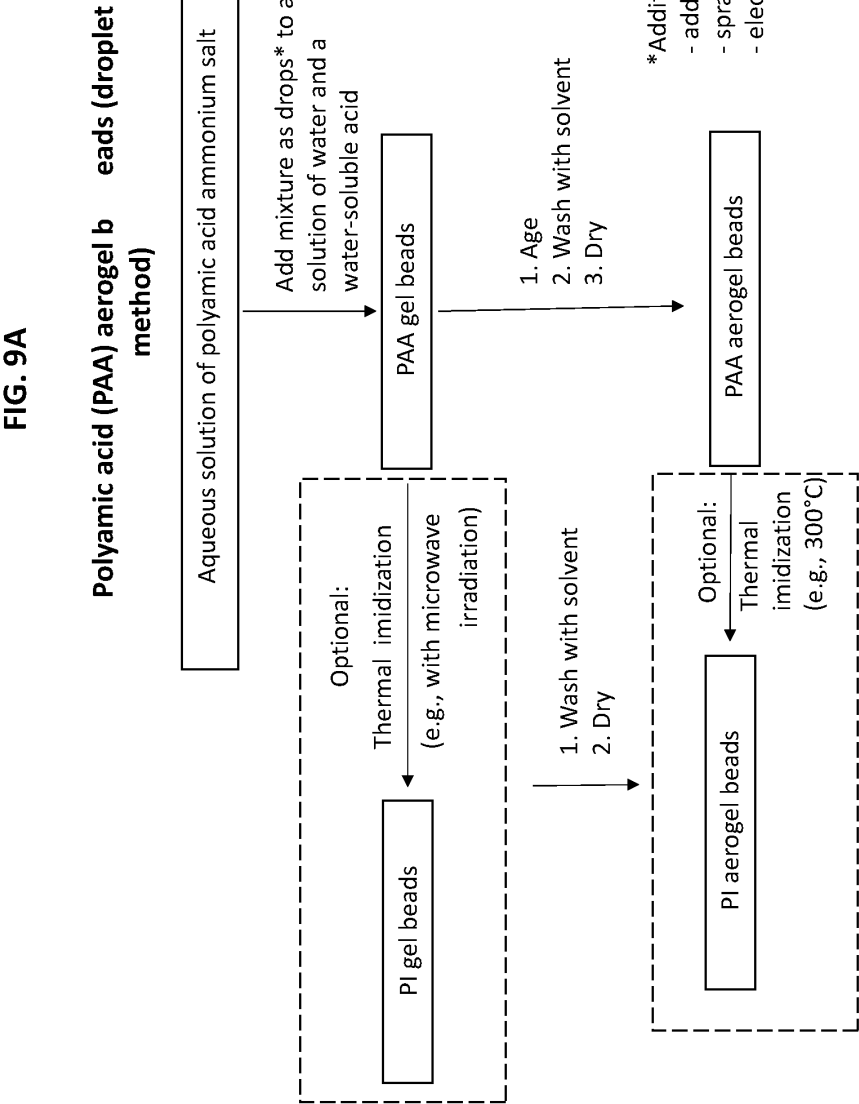


FIG. 8

Polyamic acid (PAA) aerogel monoliths





PAA: polyamic acid
PAate: polyamic acid ammonium salt
AcOH: acetic acid

FIG. 9B

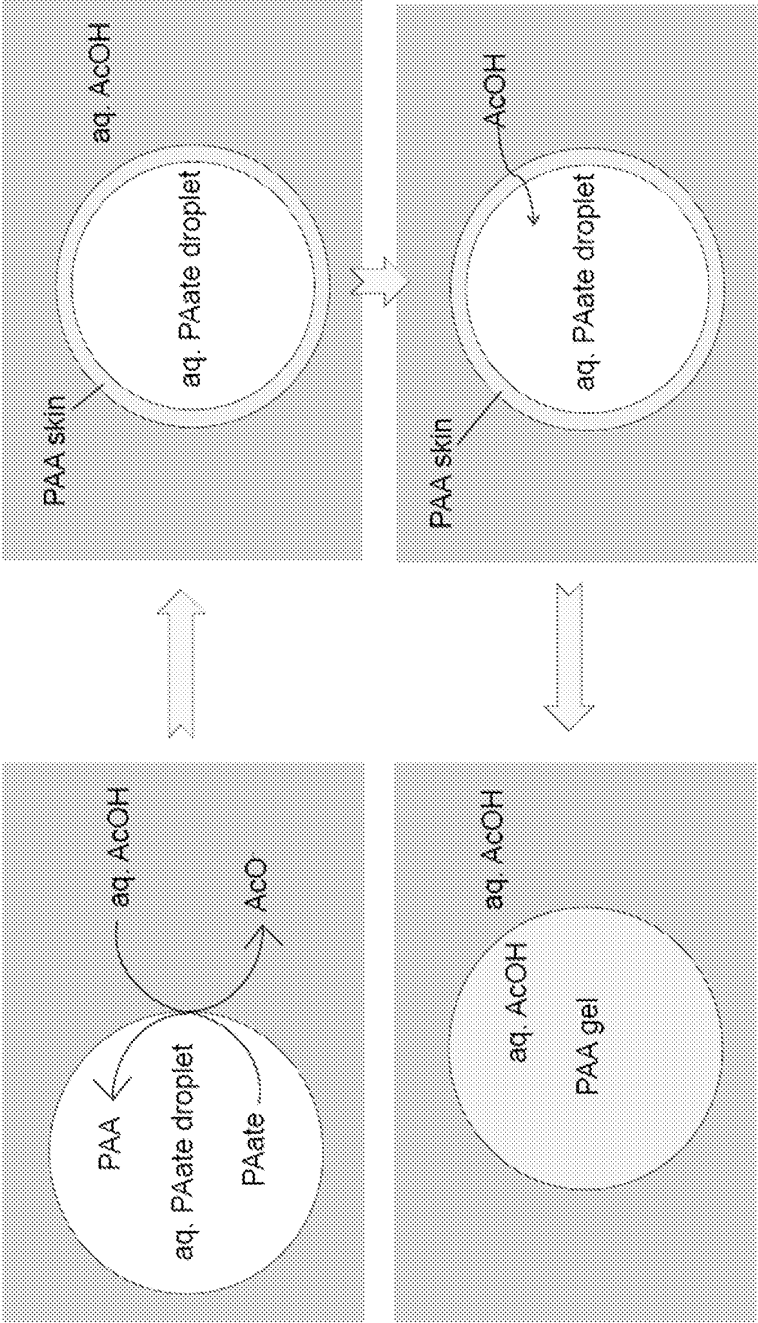


FIG. 10
Polyamic acid (PAA) and Polyimide (PI) aerogel microbeads (emulsion method)

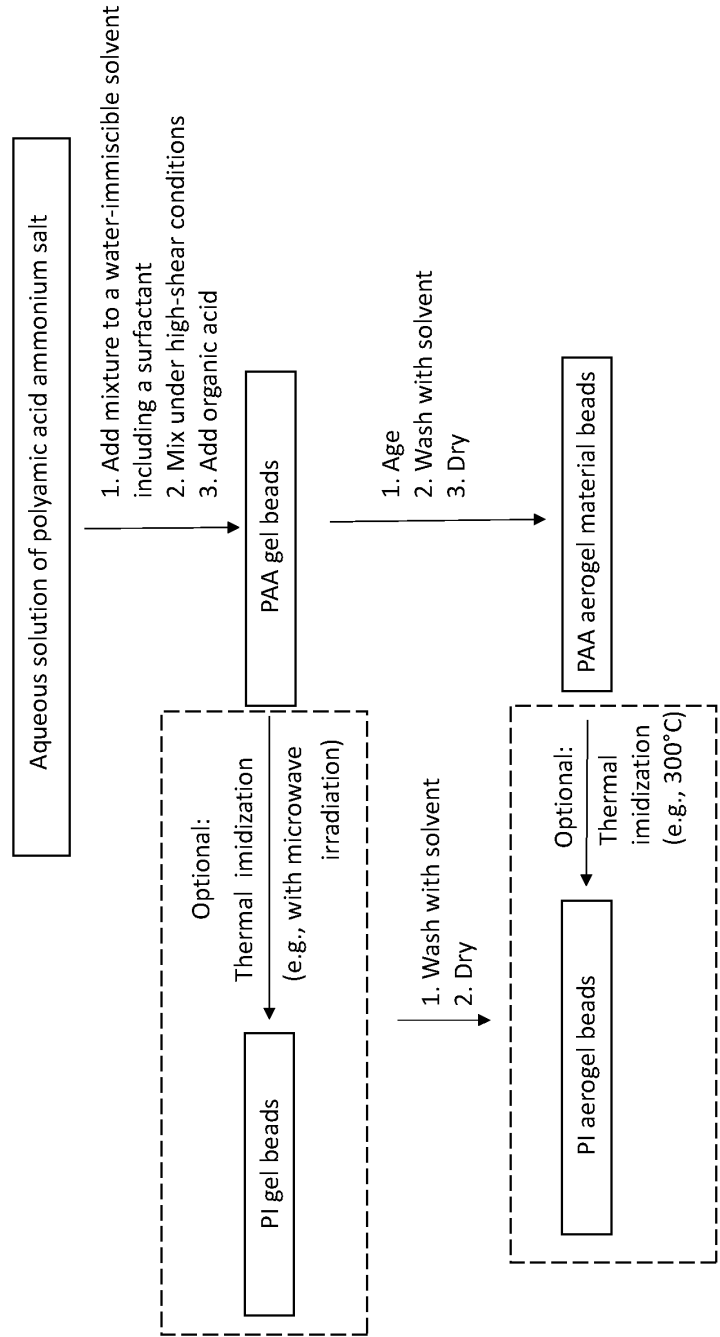


FIG. 11

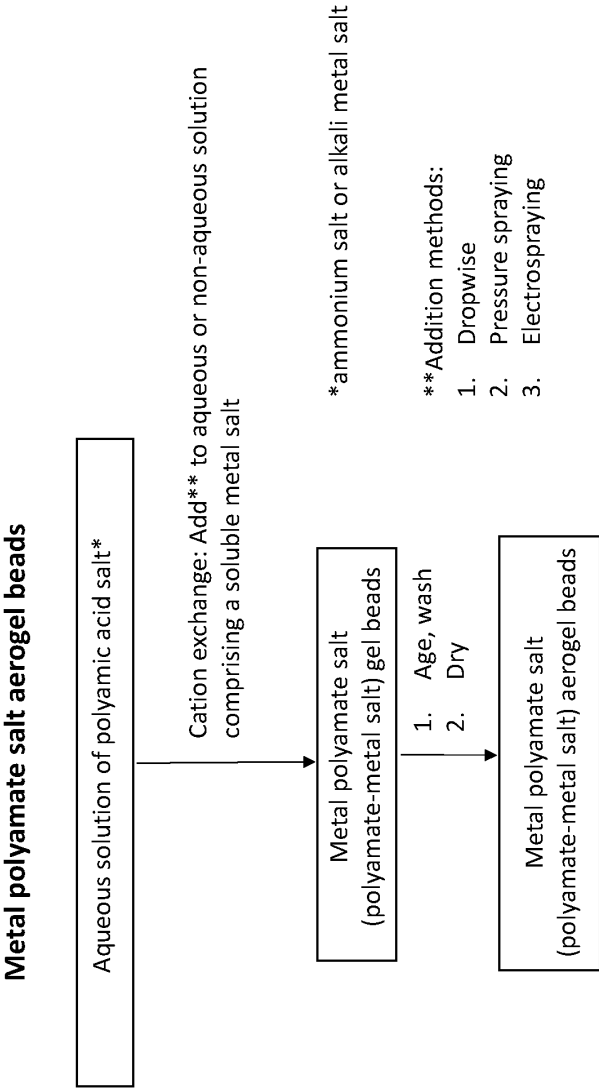


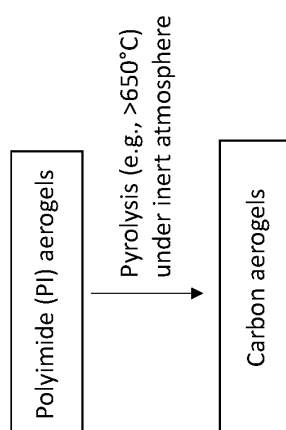
FIG. 12**Carbon aerogels from PI aerogels**

FIG. 13

Carbon aerogels from PAA aerogels

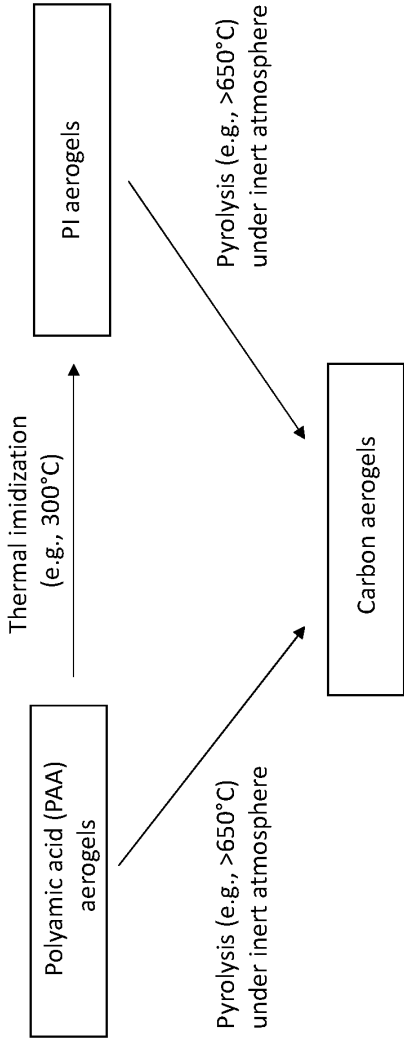


FIG. 14

**Metal- and metal oxide-doped carbon aerogels
from metal polyamate salt aerogels**

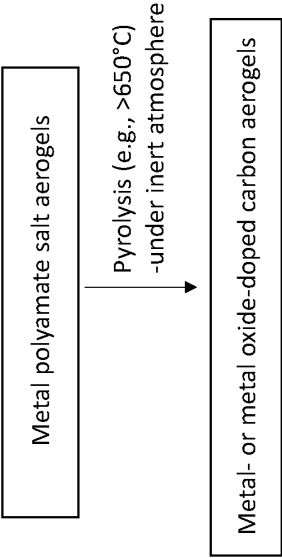


FIG. 15B

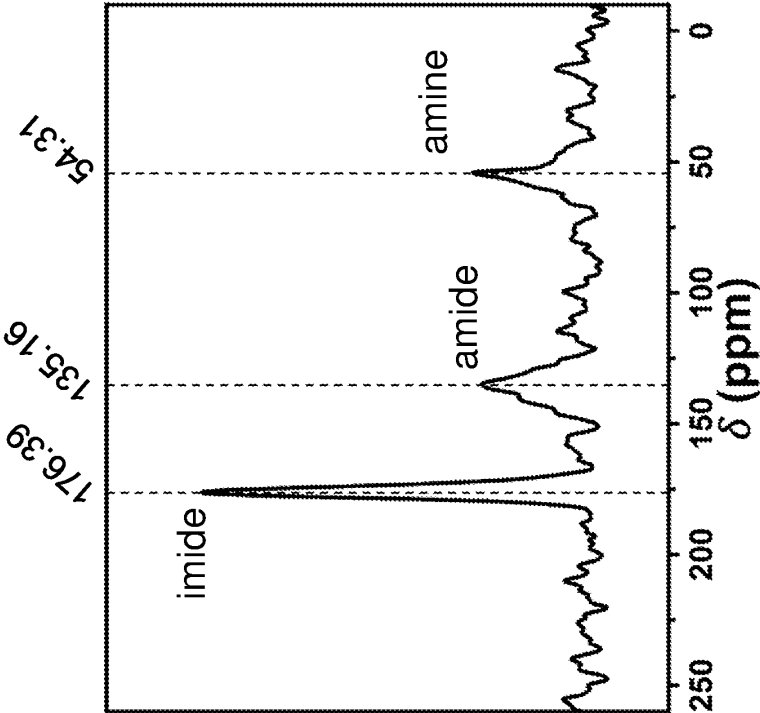


FIG. 15A

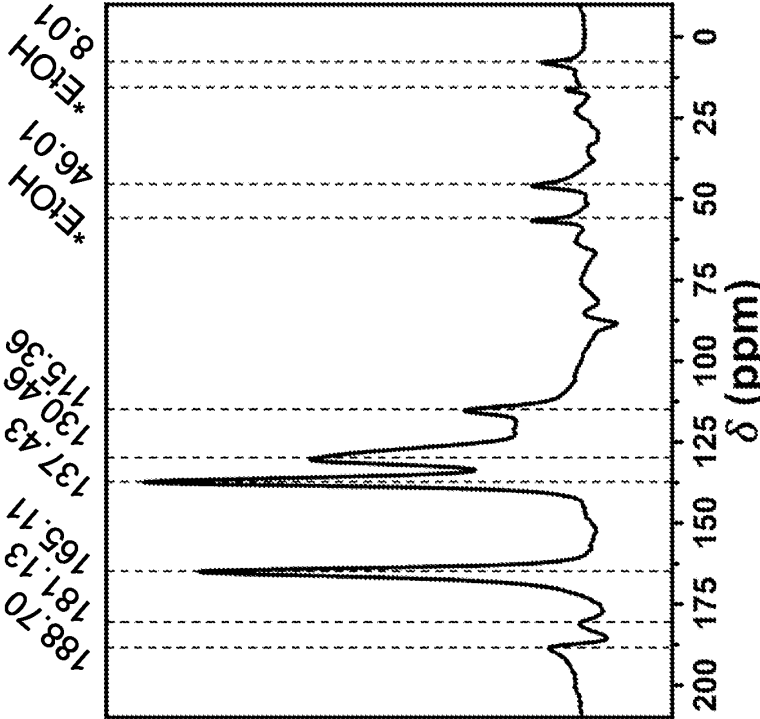


FIG. 16B

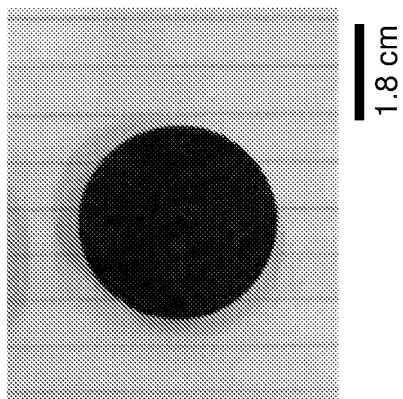


FIG. 16A

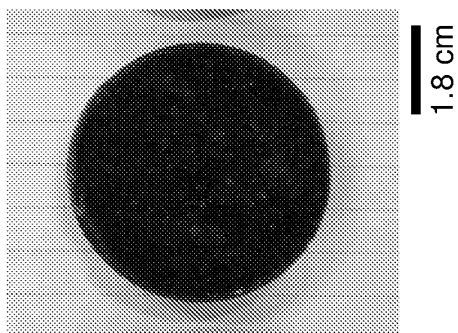


FIG. 17B

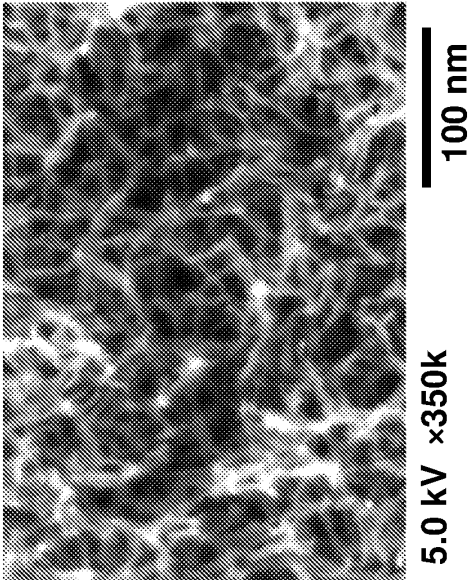


FIG. 17A

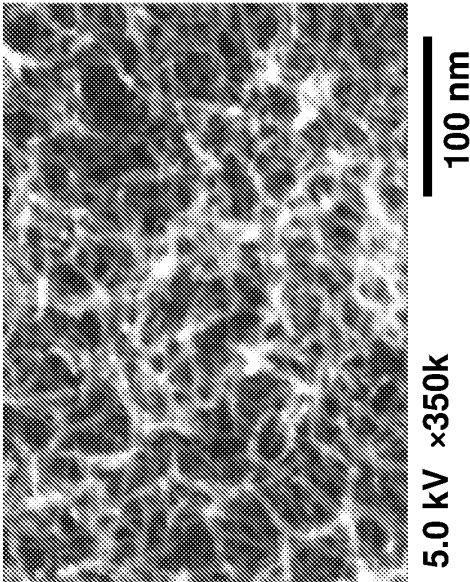


FIG. 17D

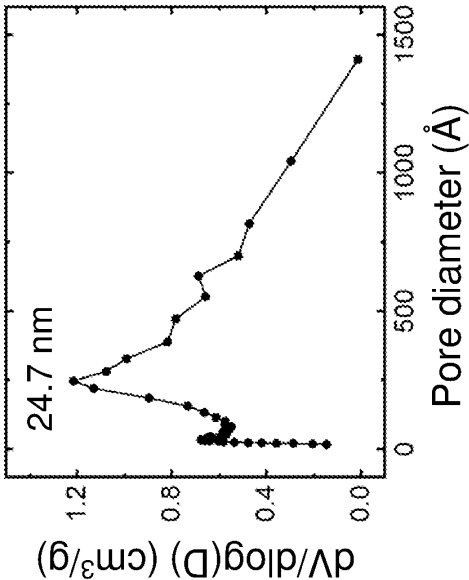


FIG. 17C

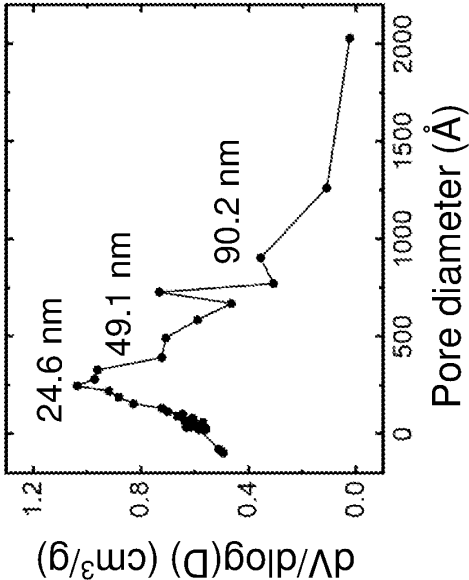


FIG. 18A

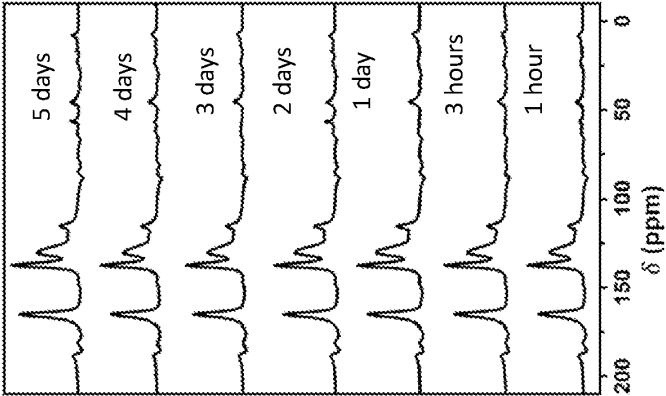
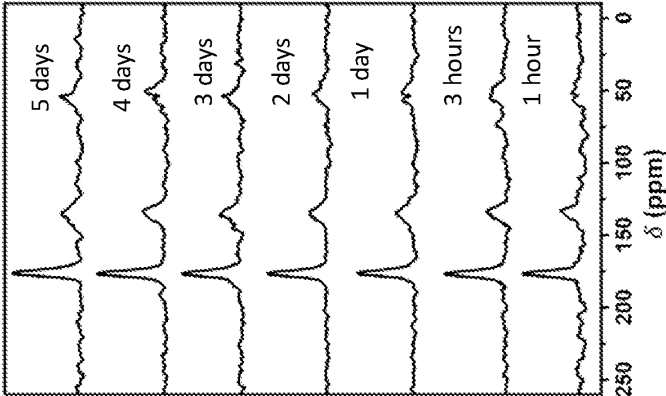


FIG. 18B



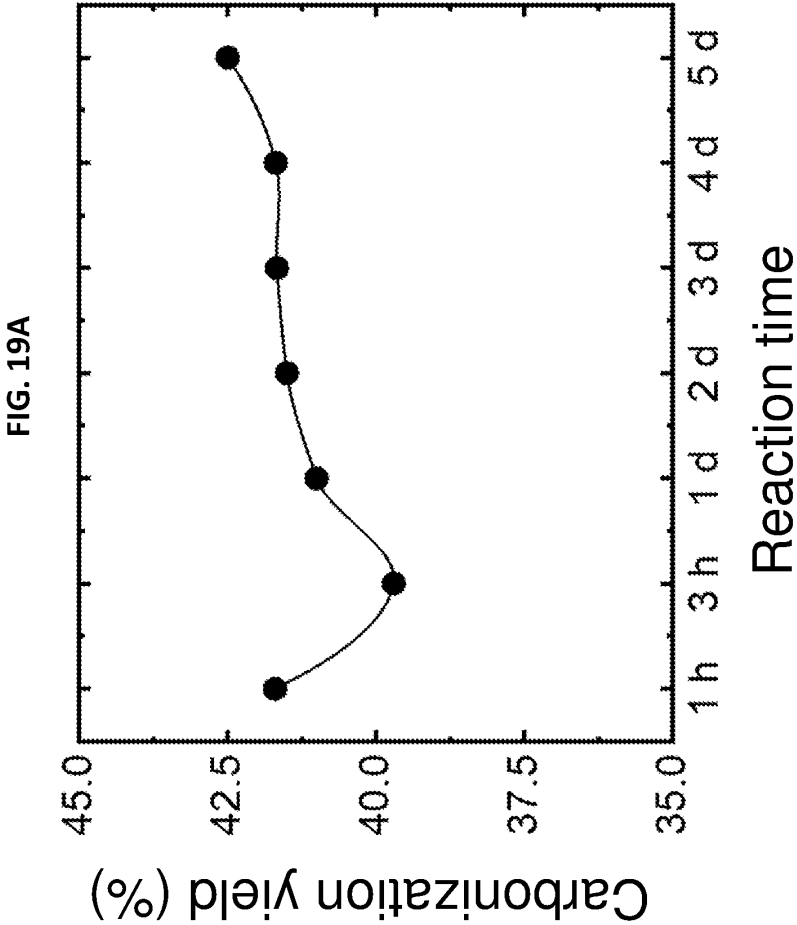


FIG. 19B

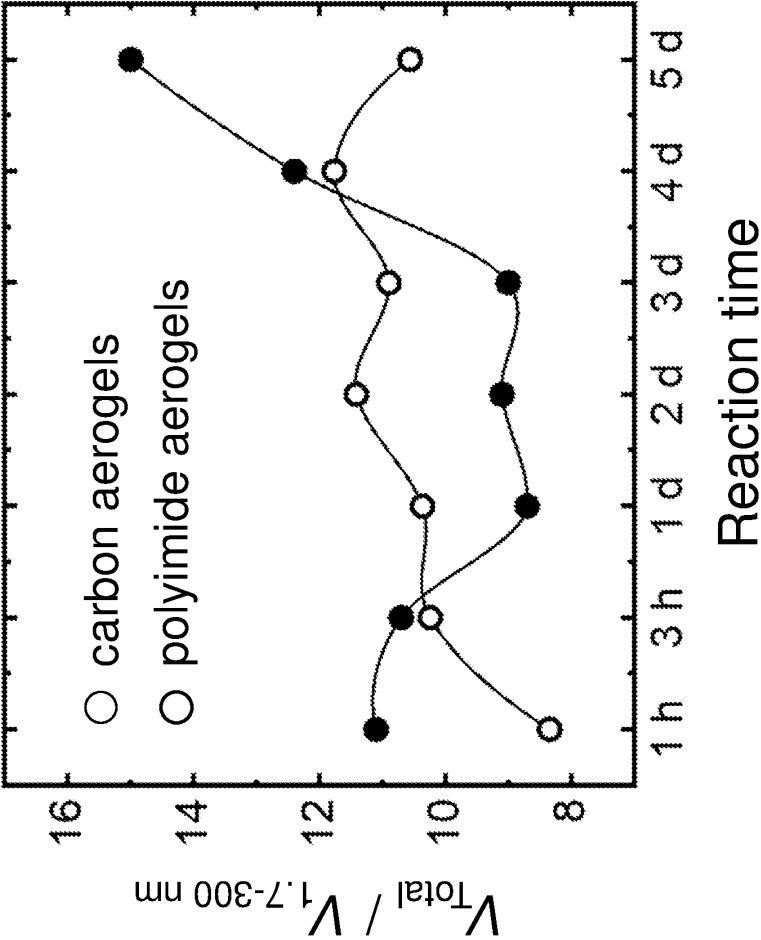


FIG. 19C

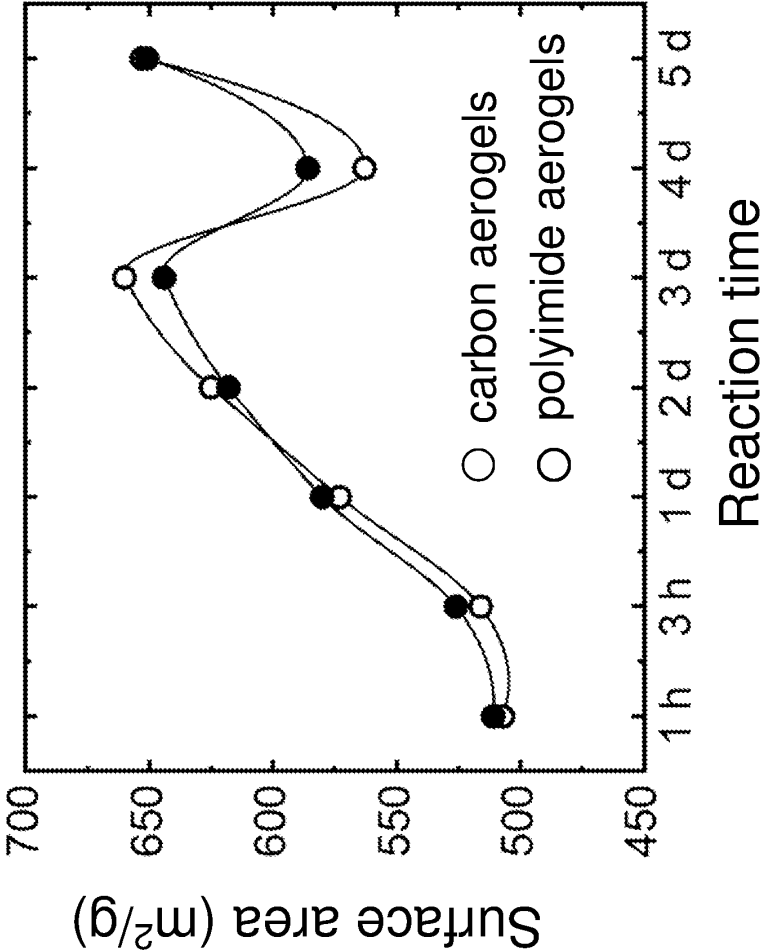


FIG. 19D

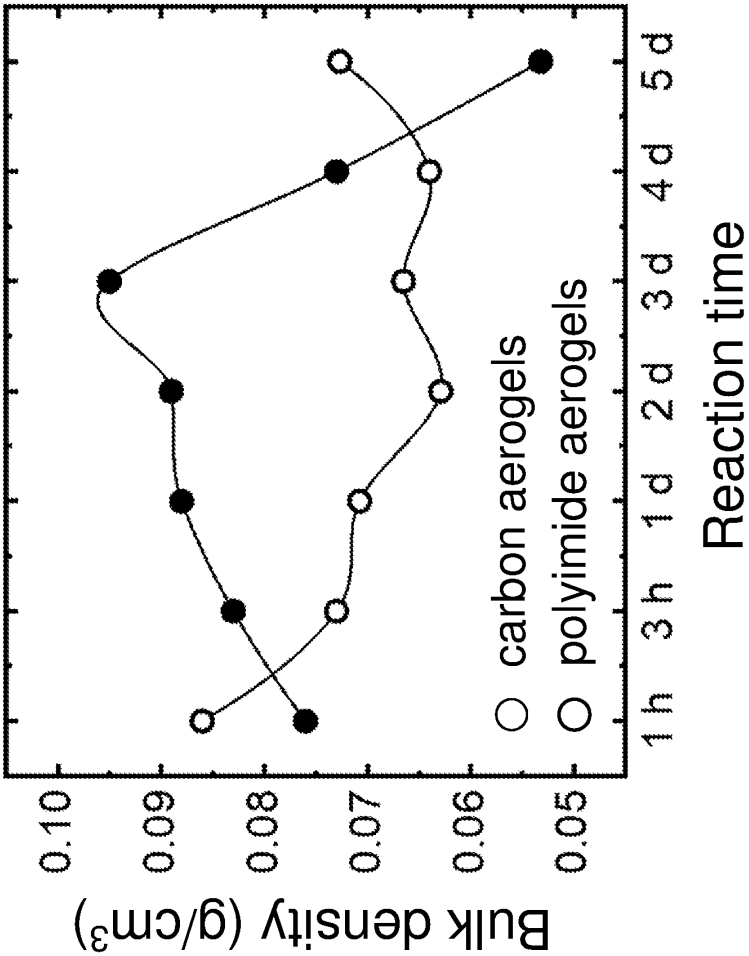


FIG. 20B

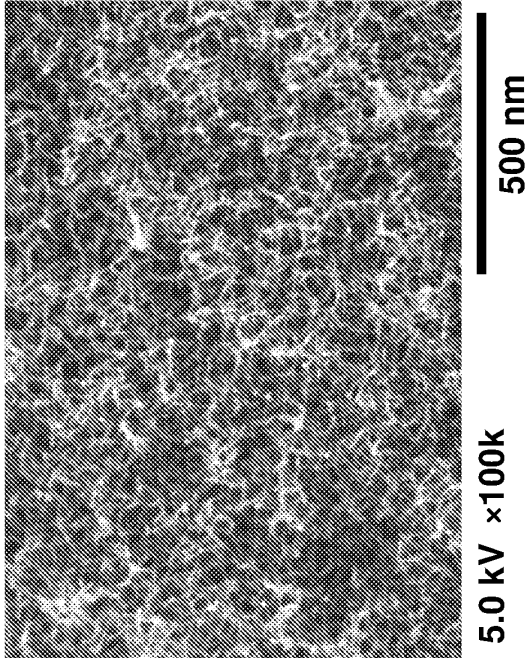


FIG. 20A

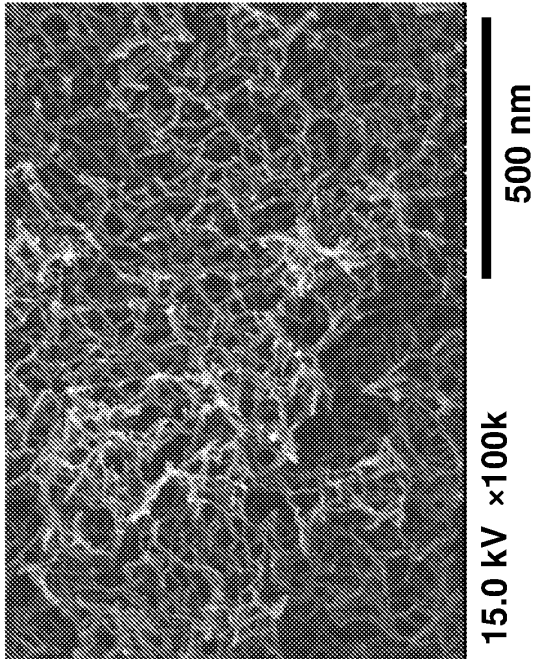


FIG. 21A

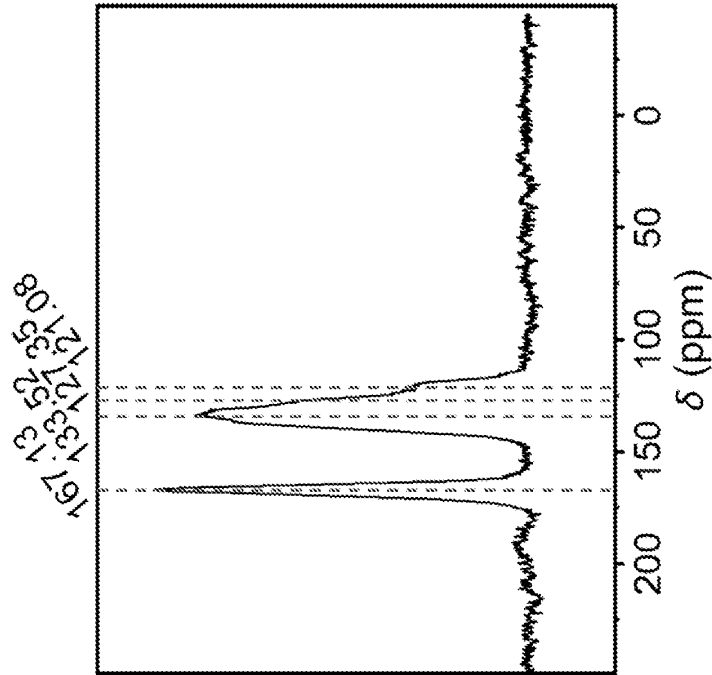


FIG. 21B

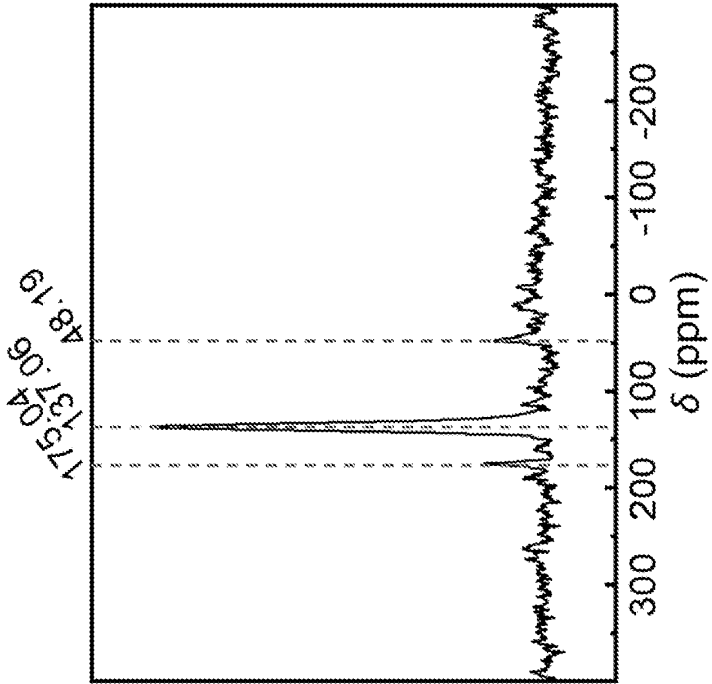


FIG. 22A

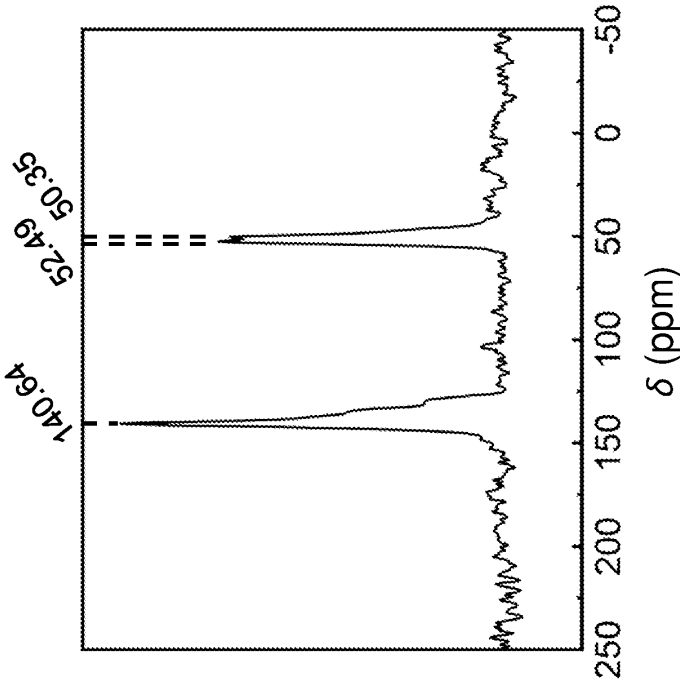


FIG. 22B

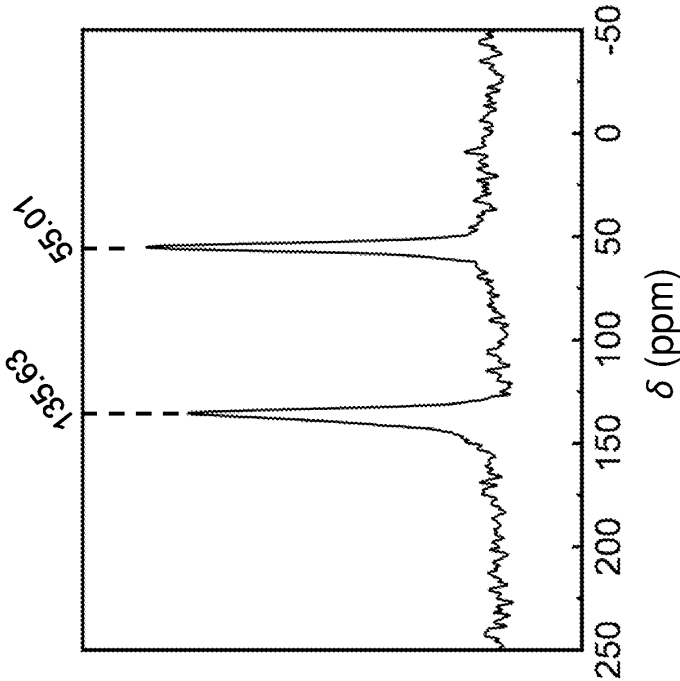


FIG. 23A

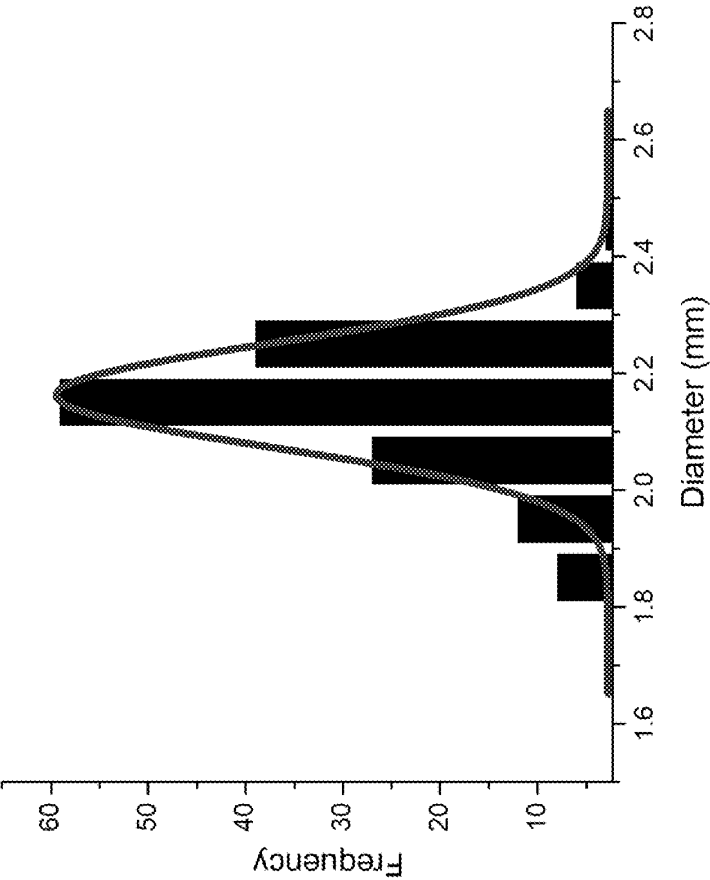


FIG. 23C

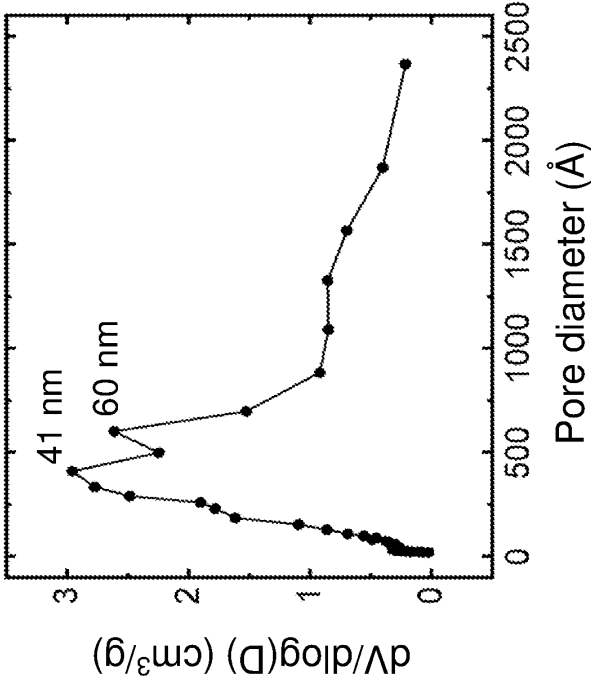


FIG. 23B

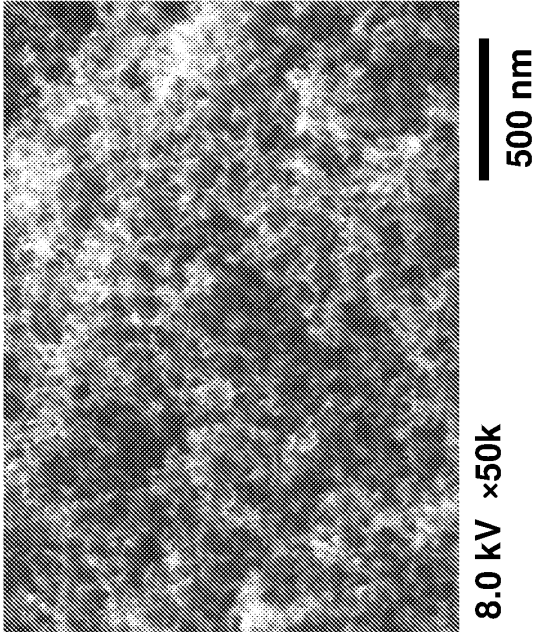


FIG. 25

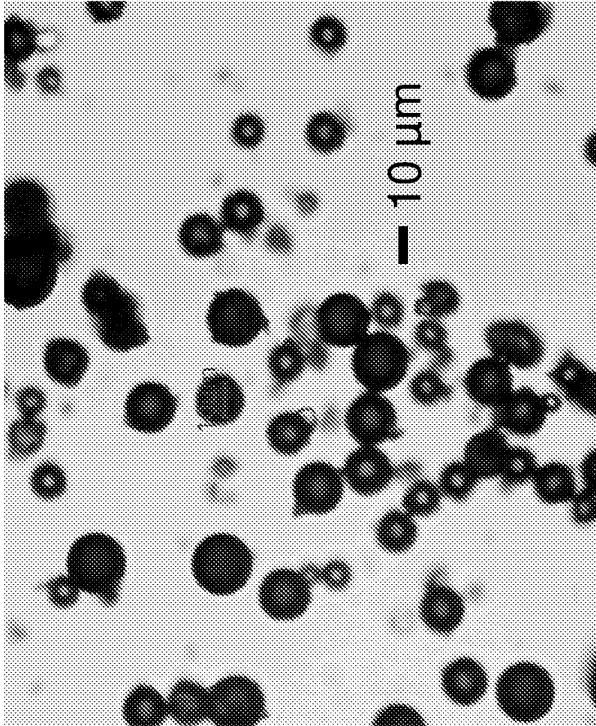


FIG. 24

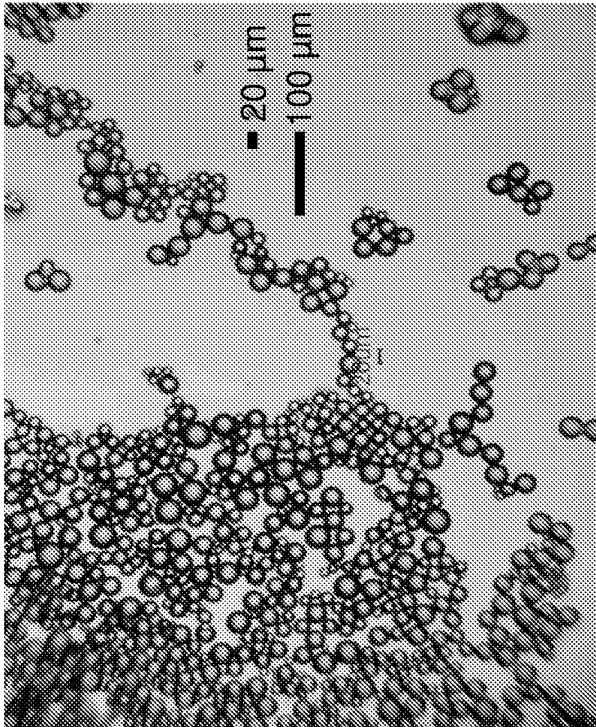


FIG. 26

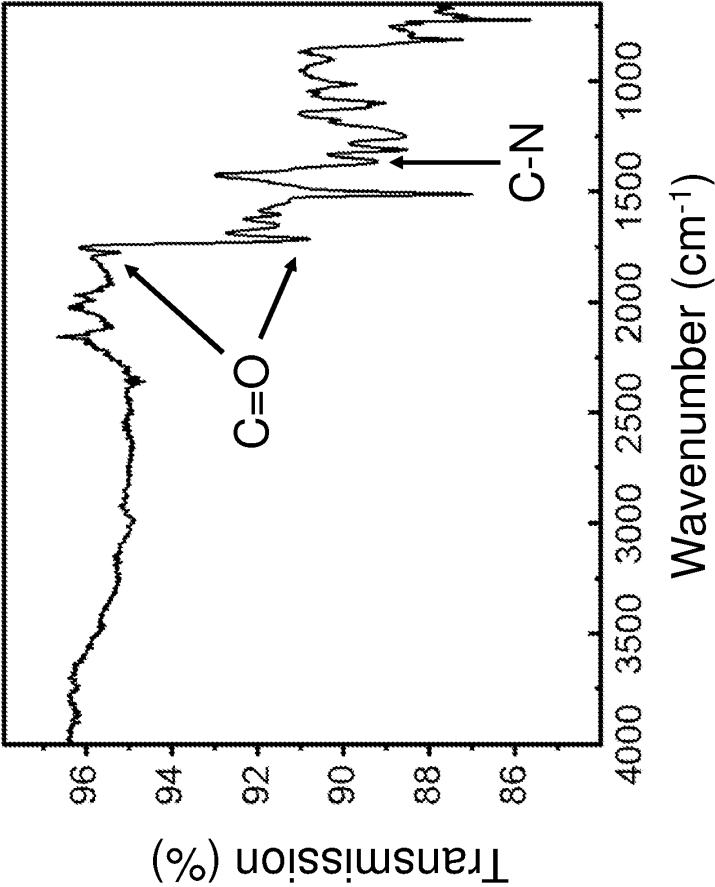


FIG. 27B

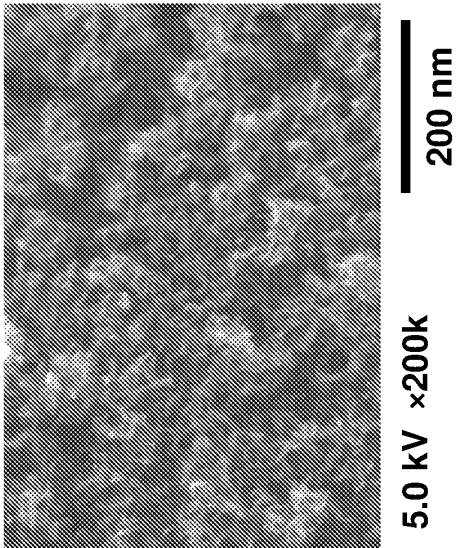
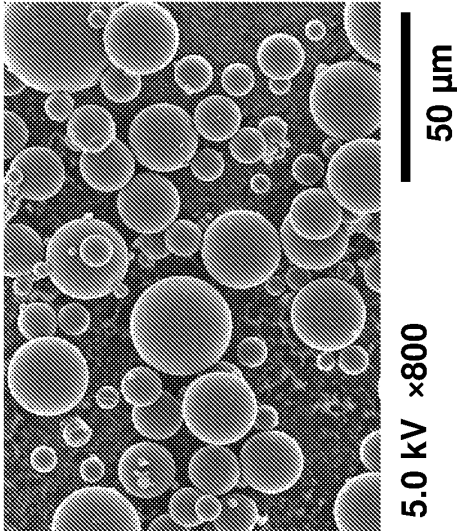


FIG. 27A



aerogel interior

FIG. 27C

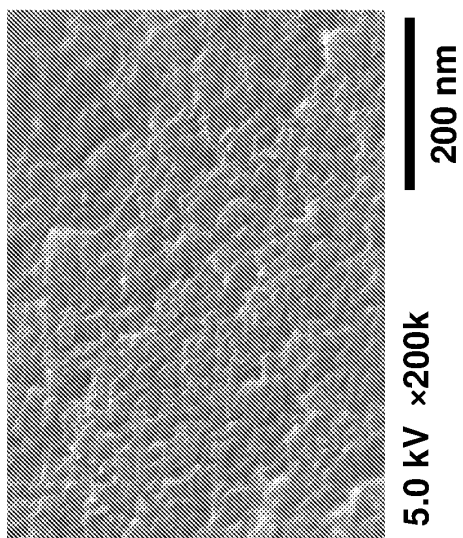


FIG. 28

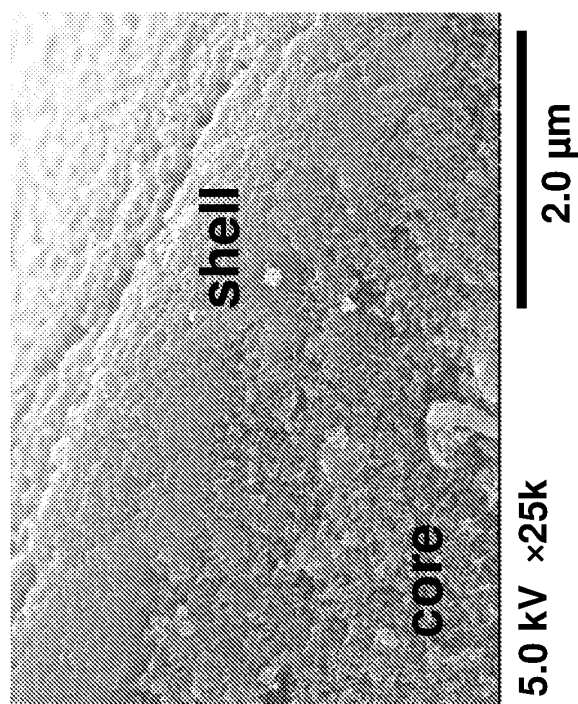


FIG. 29A

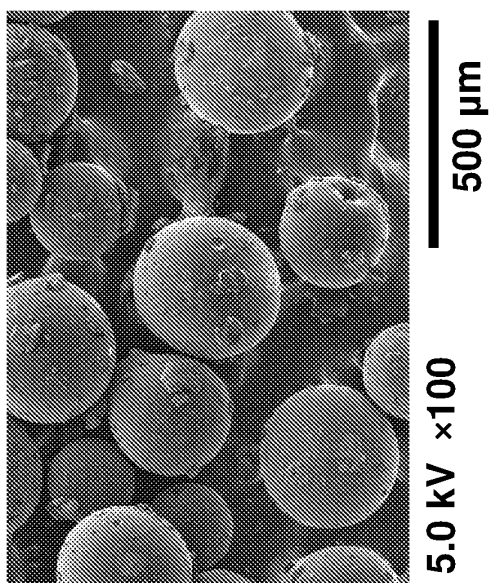


FIG. 29B

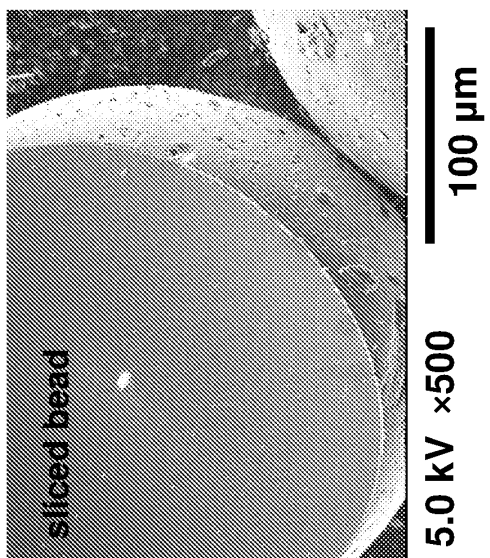


FIG. 29C

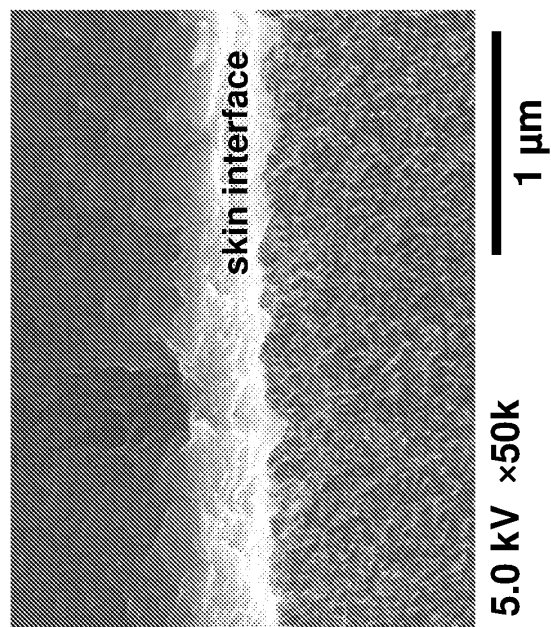


FIG. 30

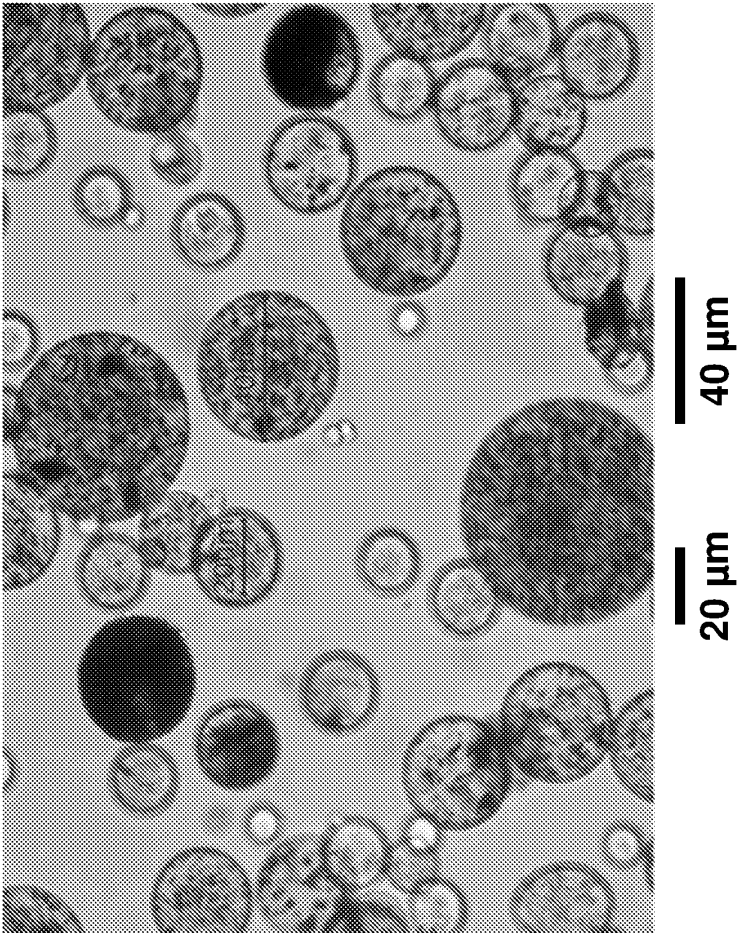


FIG. 31A

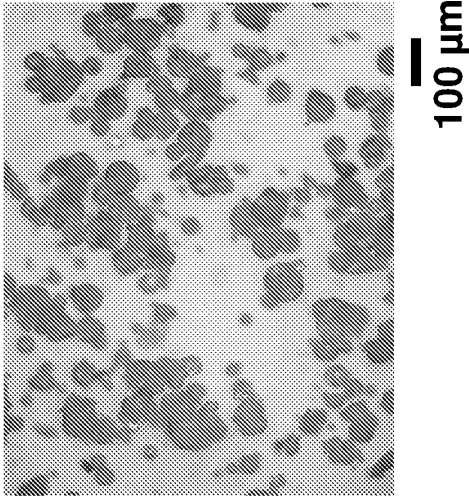


FIG. 31B

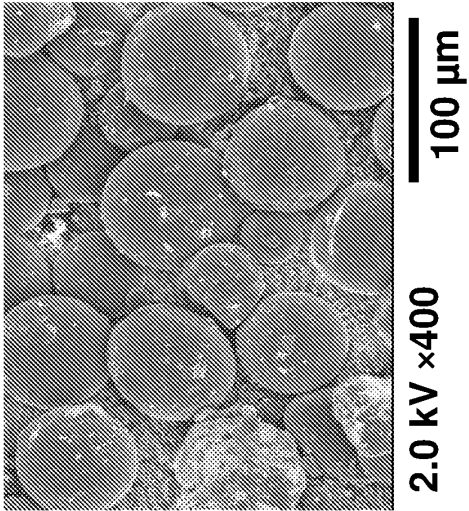


FIG. 31C

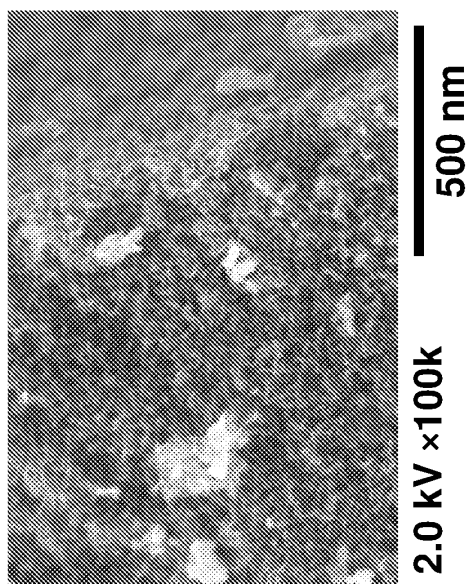


FIG. 32

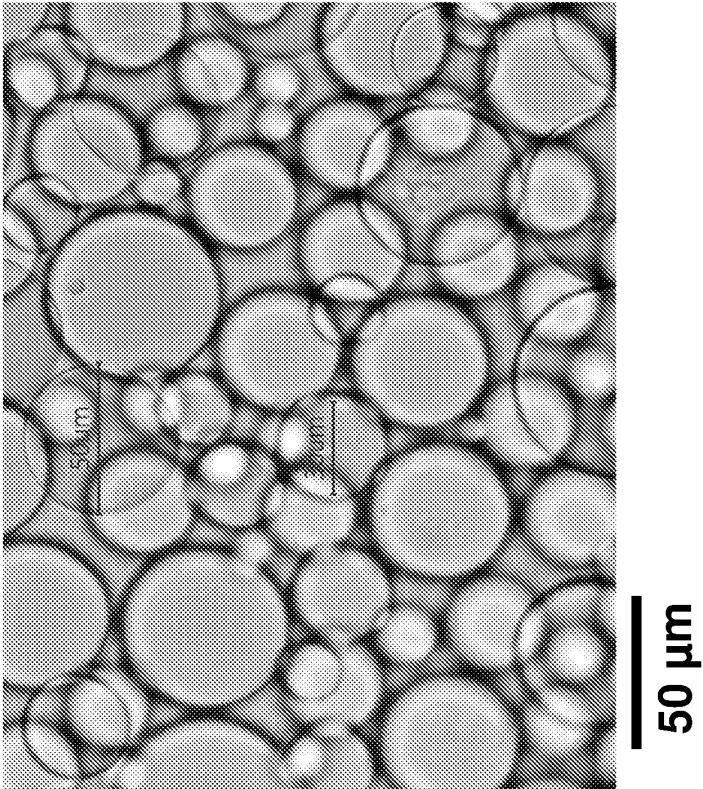


FIG. 33

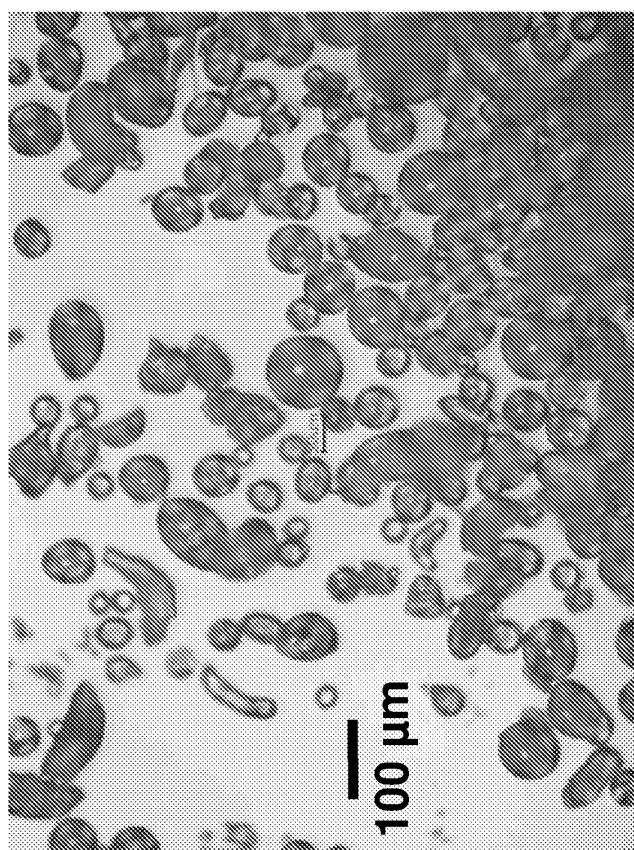


FIG. 34B

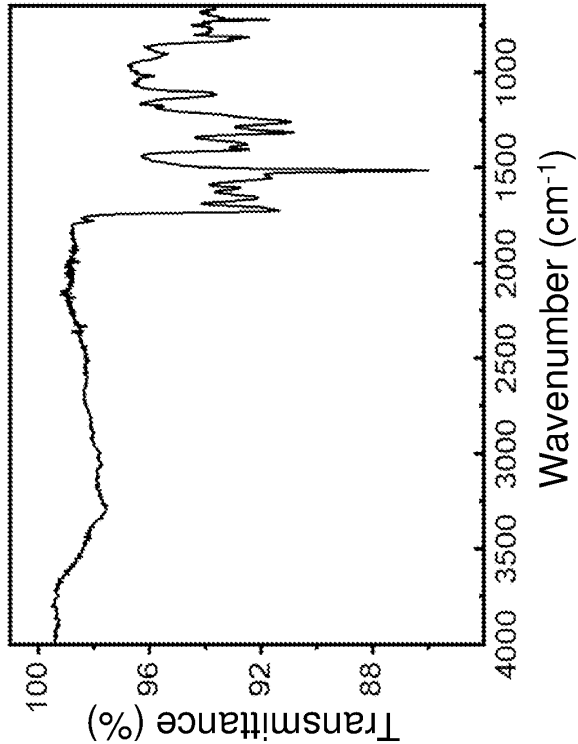


FIG. 34A

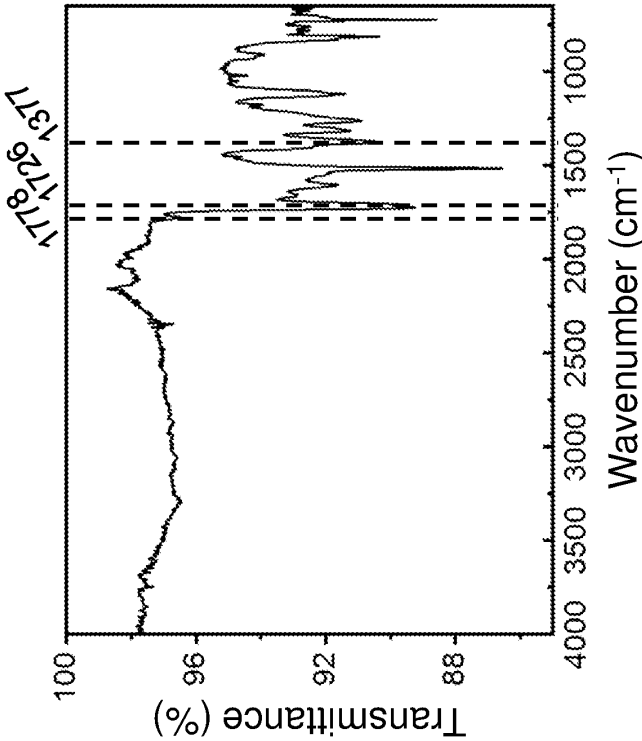


FIG. 35B

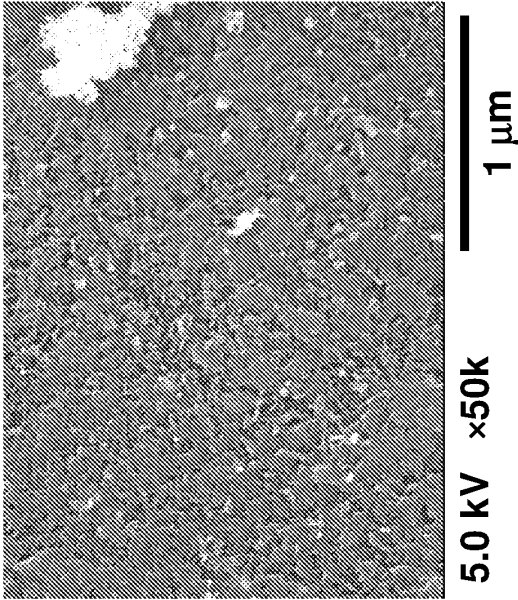


FIG. 35A

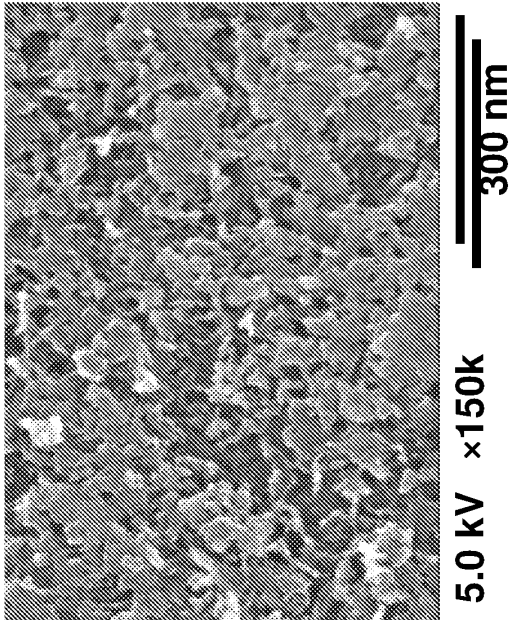


FIG. 35C

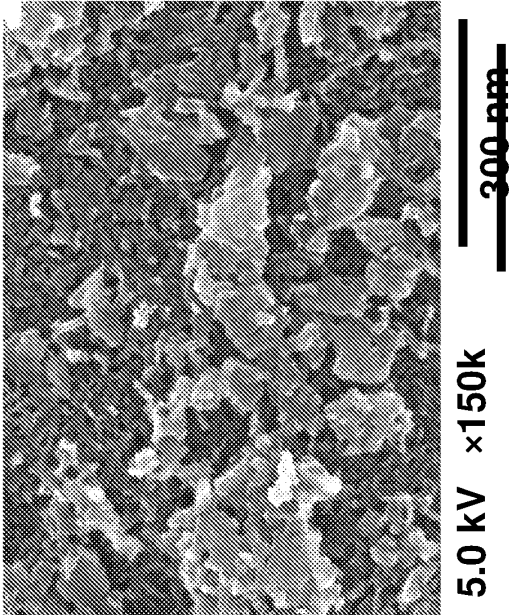


FIG. 35D

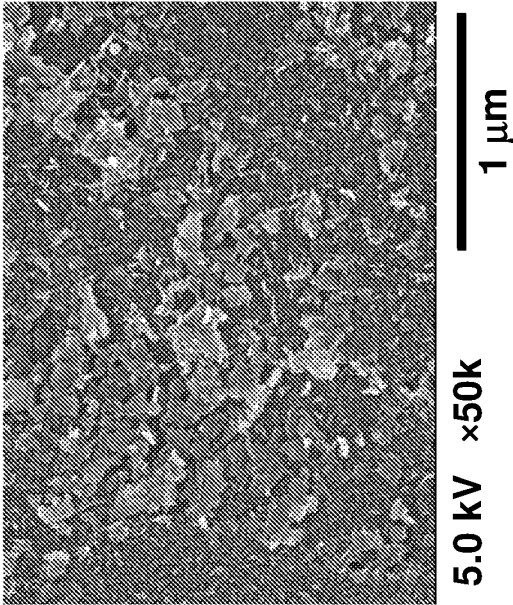


FIG. 36B

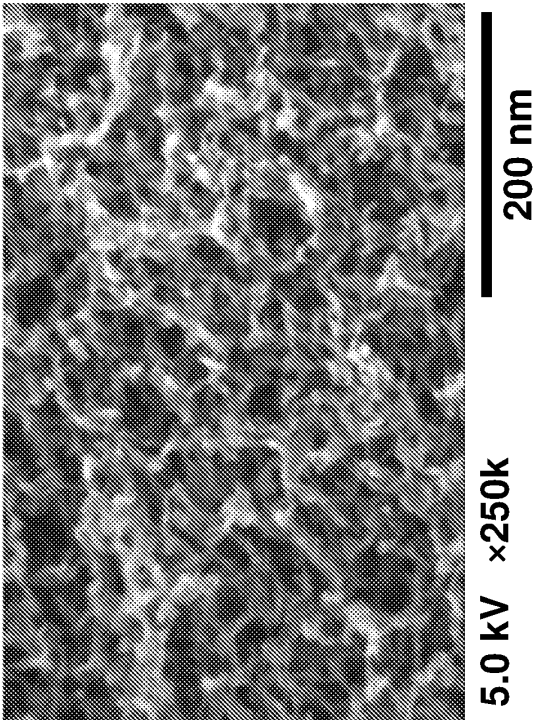


FIG. 36A

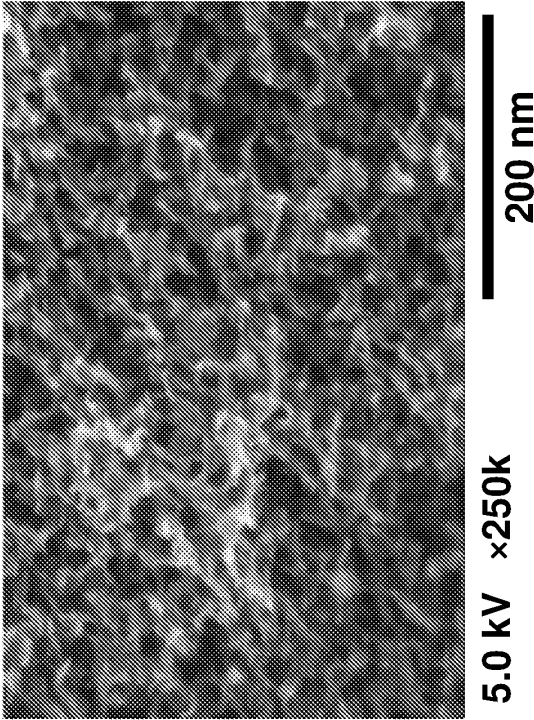
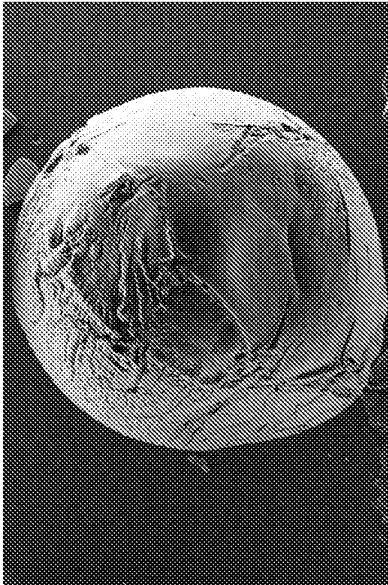


FIG. 37A

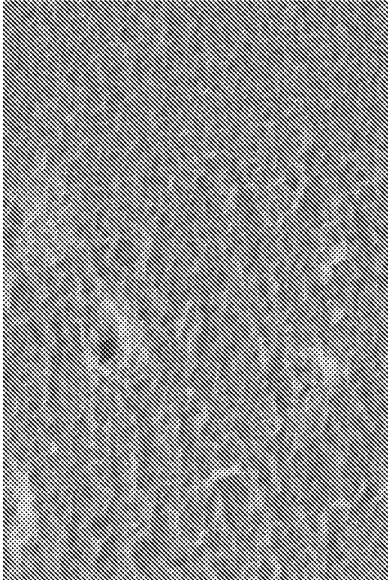


ins

5.0 kV x41

1 mm

FIG. 37B



8.0 kV x50k

500 nm

FIG. 37C

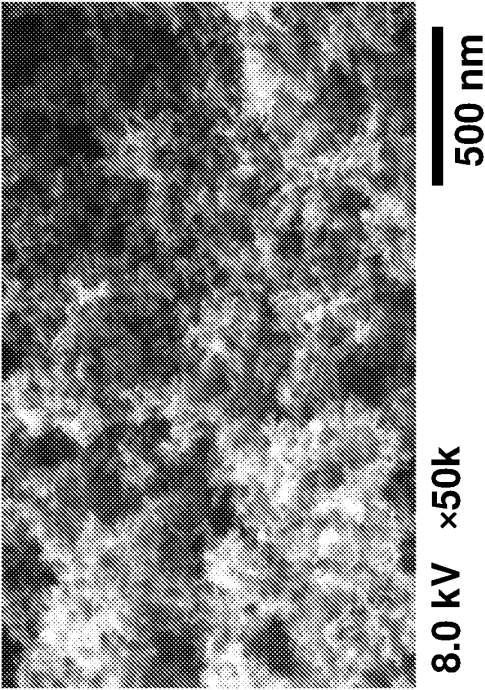


FIG. 37D

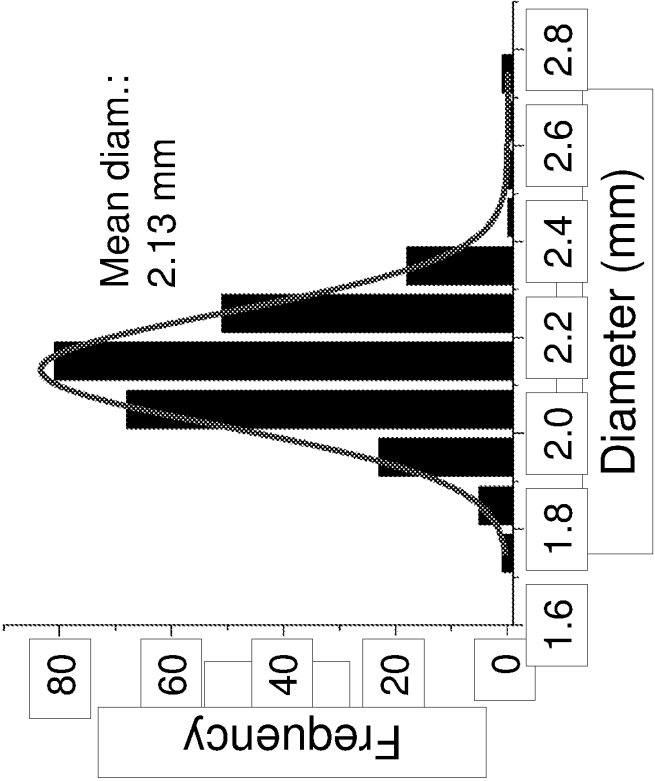
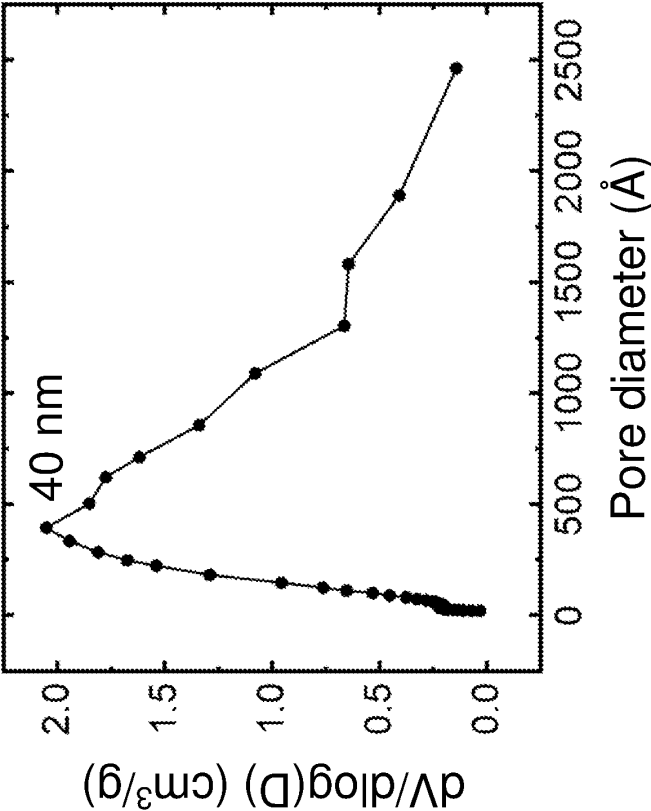


FIG. 38



skin

FIG. 39A

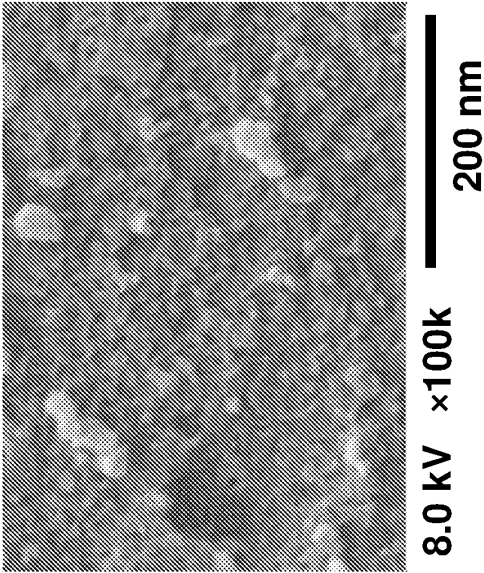
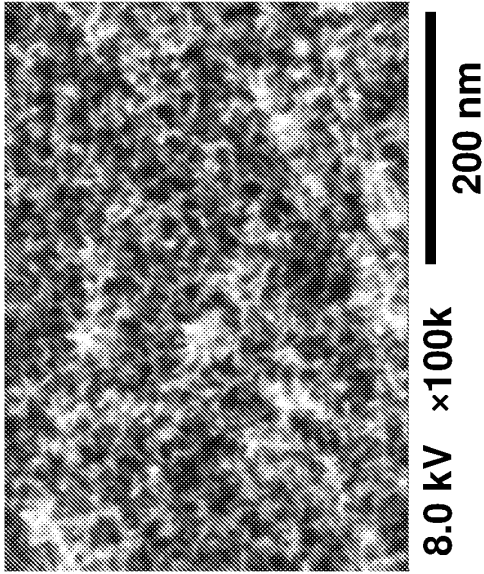


FIG. 39B



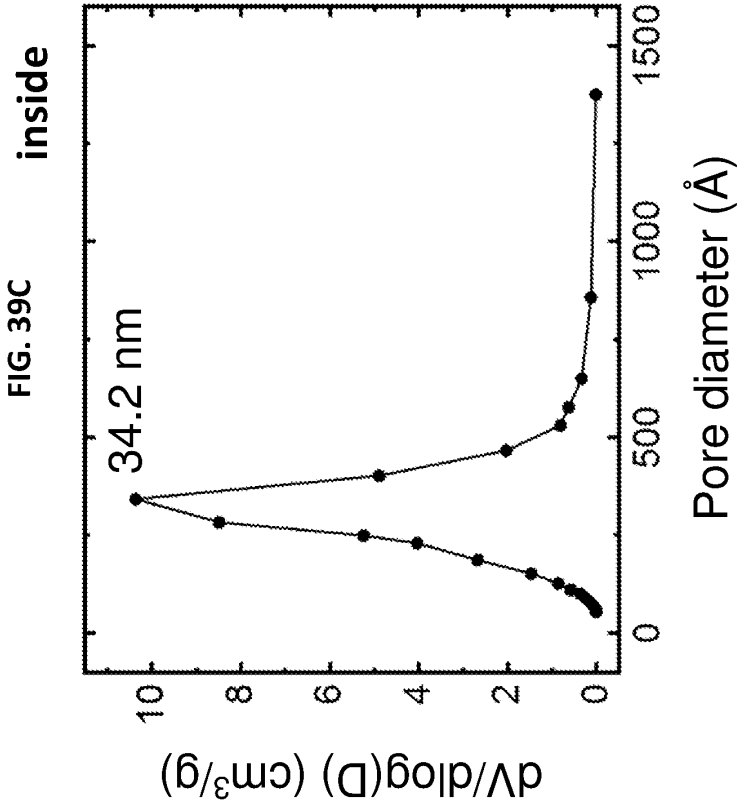


FIG. 40A

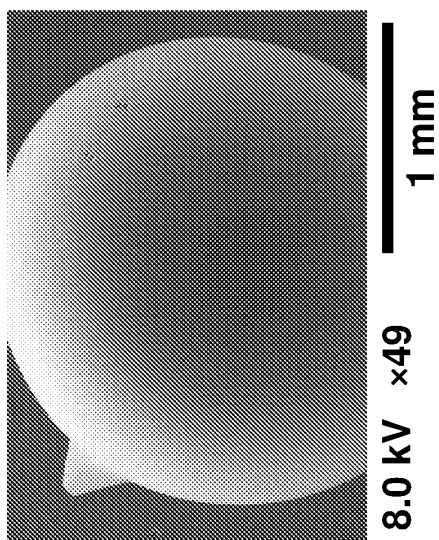


FIG. 40C

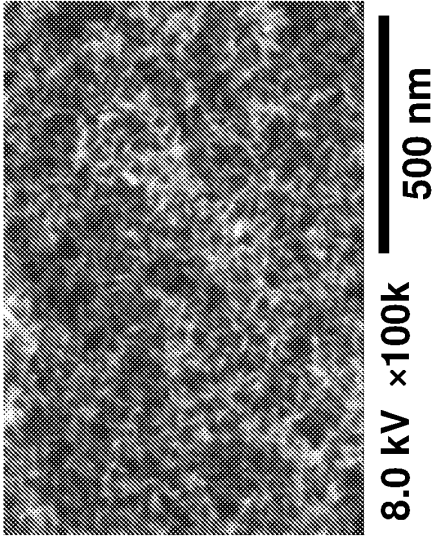
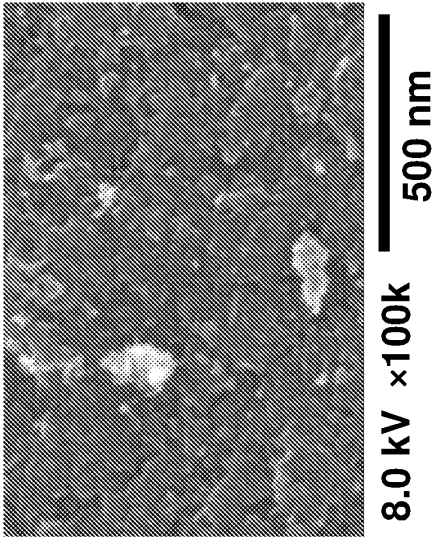


FIG. 40B



skin

FIG. 41B

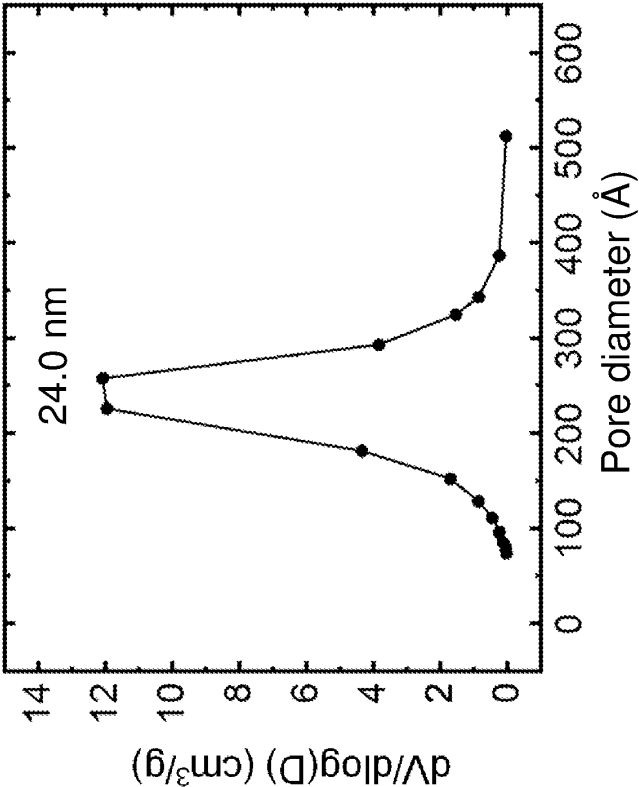


FIG. 41A

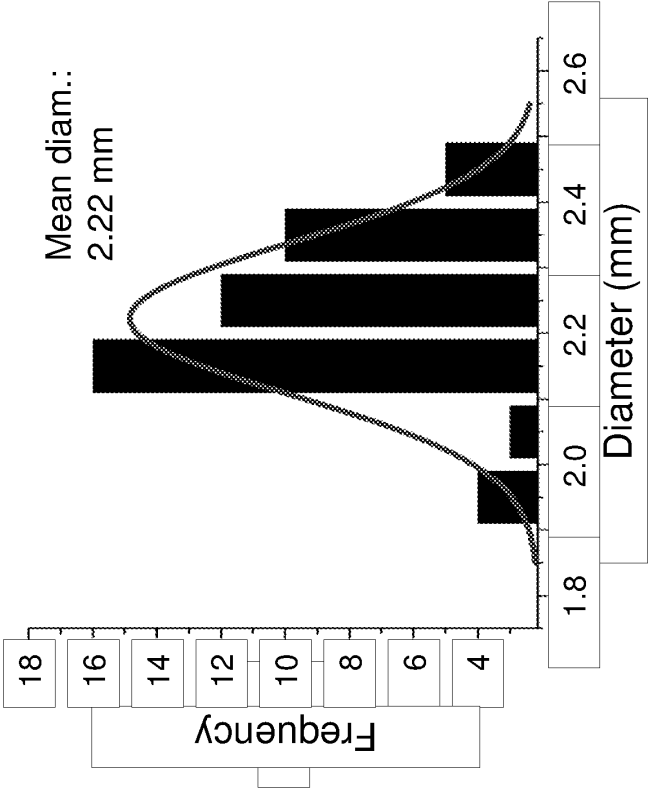


FIG. 42B

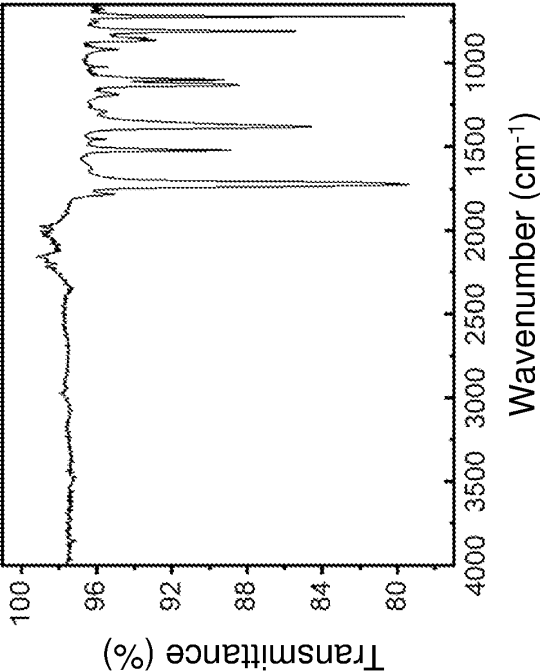


FIG. 42A

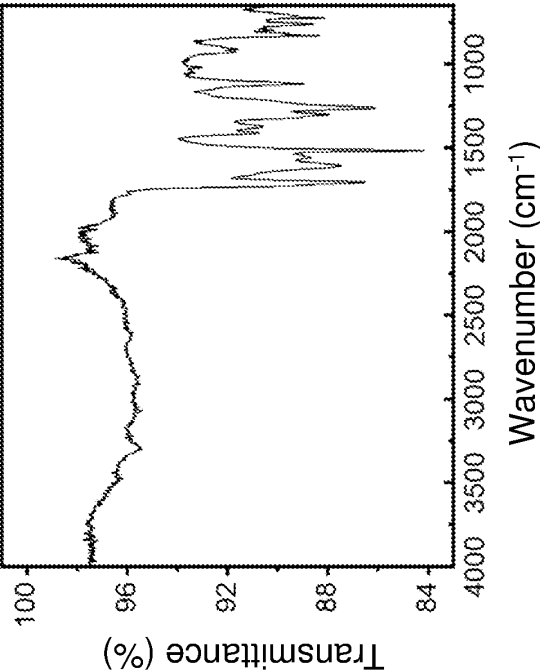
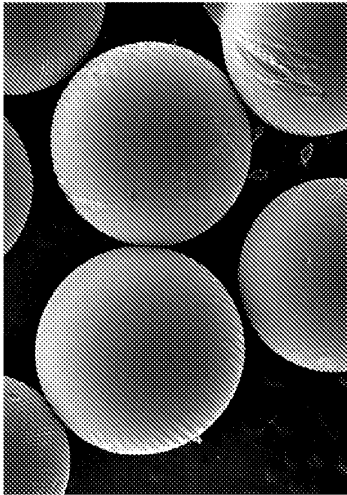
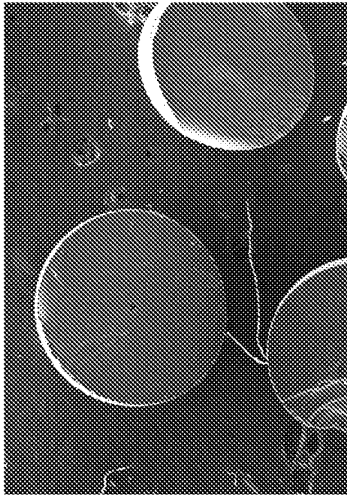


FIG. 43A



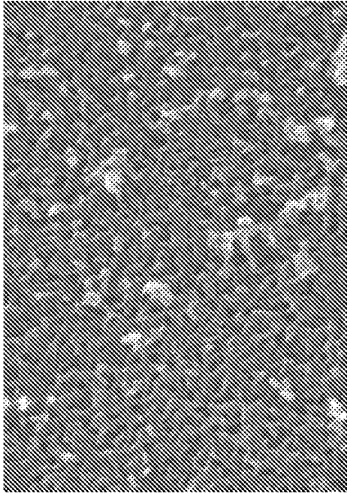
15.0 kV x35
1 mm

FIG. 43C



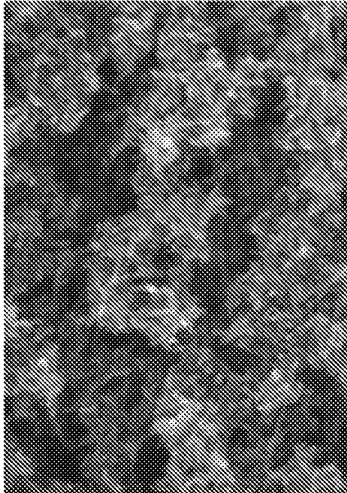
15.0 kV x35
1 mm

FIG. 43B



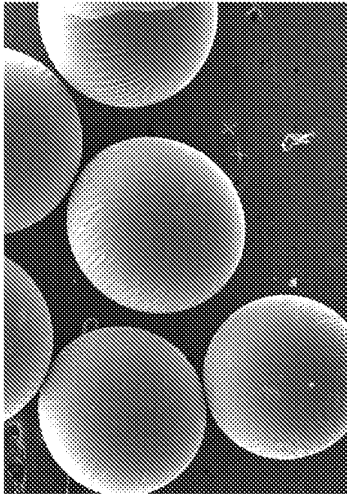
15.0 kV x150k
300 nm

FIG. 43D



15.0 kV x150k
300 nm

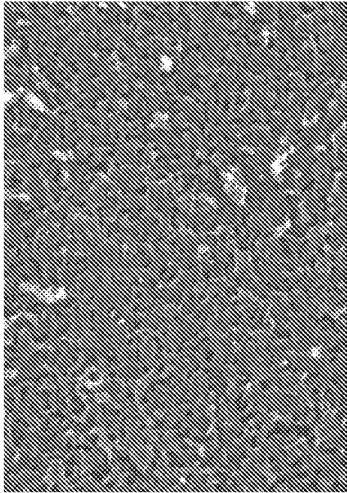
FIG. 44A



15.0 kV x35

1 mm

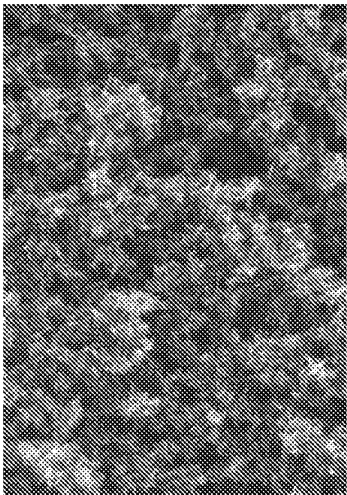
FIG. 44B



15.0 kV x150k

300 nm

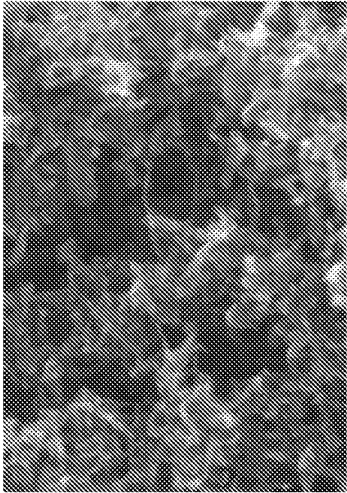
FIG. 44C



15.0 kV x50k

1 μm

FIG. 44D



15.0 kV x250k

200 nm

FIG. 45A

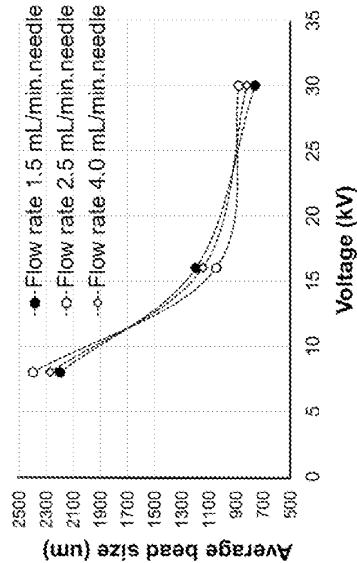


FIG. 45B

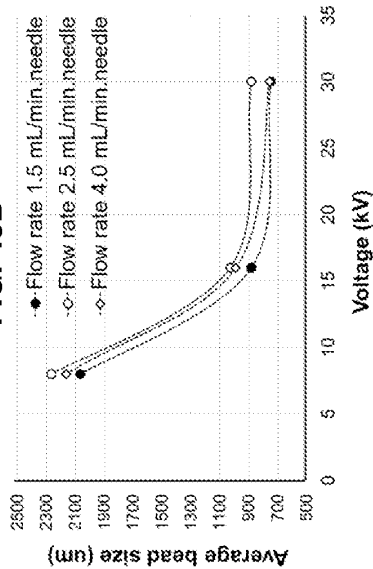


FIG. 45C

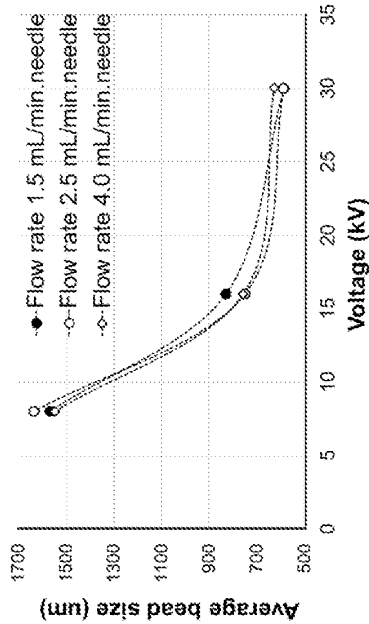


FIG. 45D

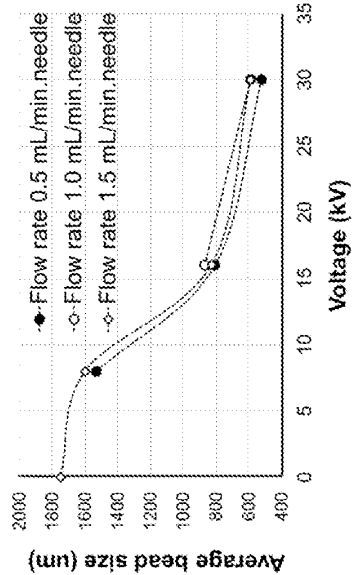


FIG. 46B

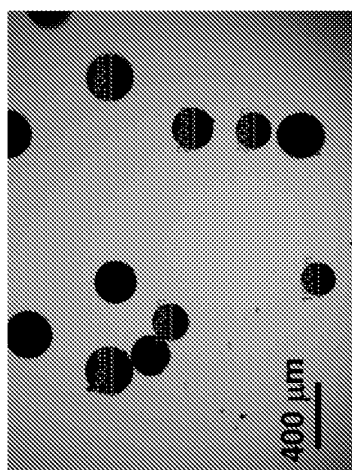


FIG. 46A

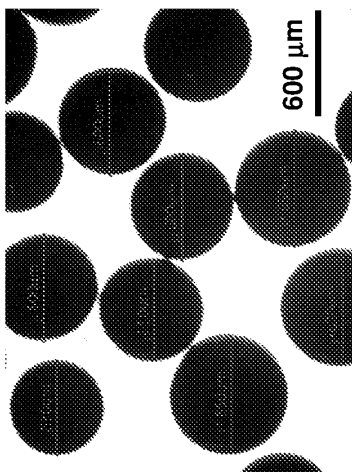


FIG. 47

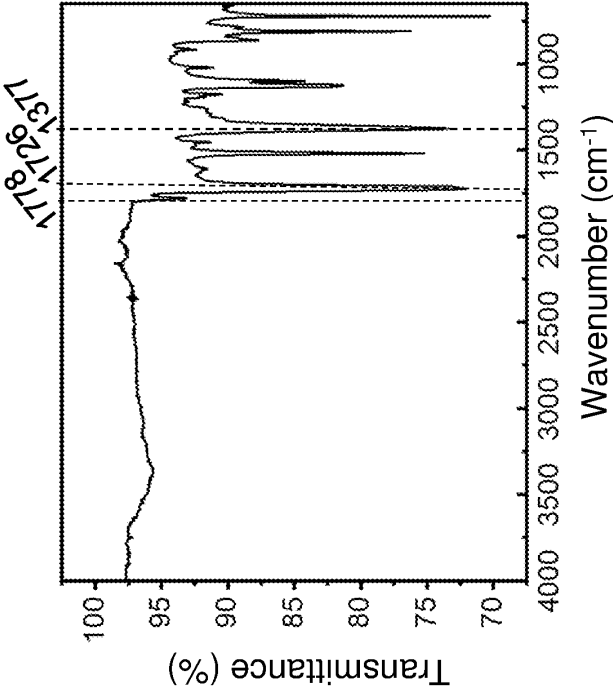
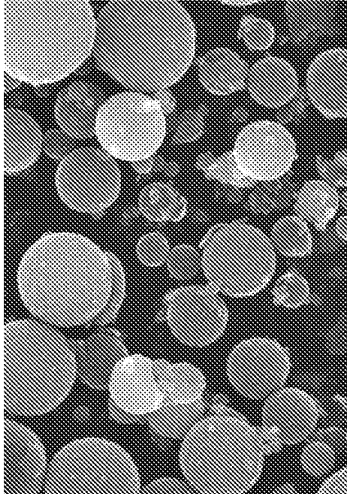


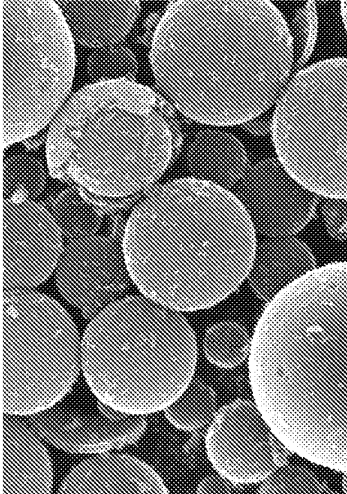
FIG. 48A



15.0 kV x5k

10 μm

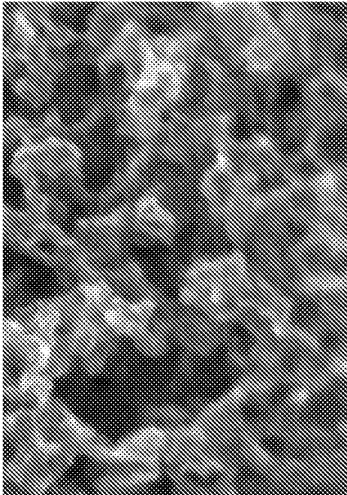
FIG. 48C



15.0 kV x5k

10 μm

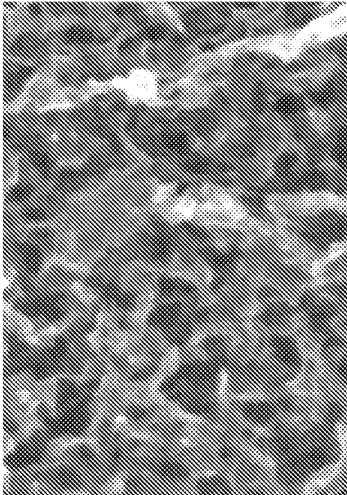
FIG. 48B



15.0 kV x350k

100 nm

FIG. 48D



15.0 kV x350k

100 nm

FIG. 49A

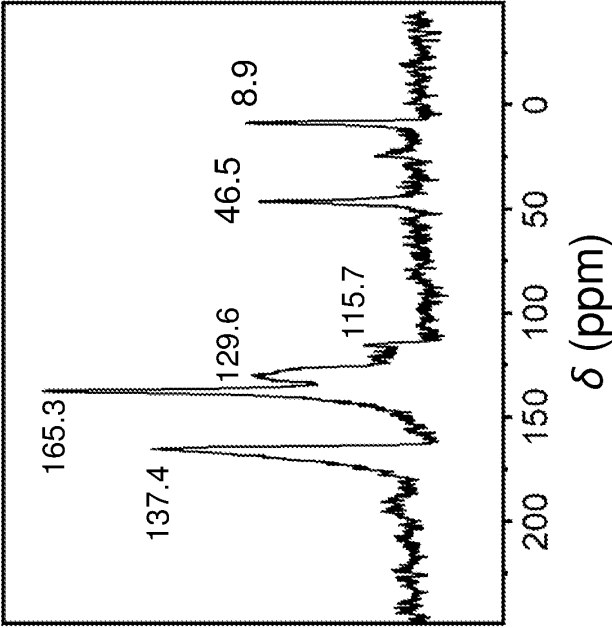


FIG.49B

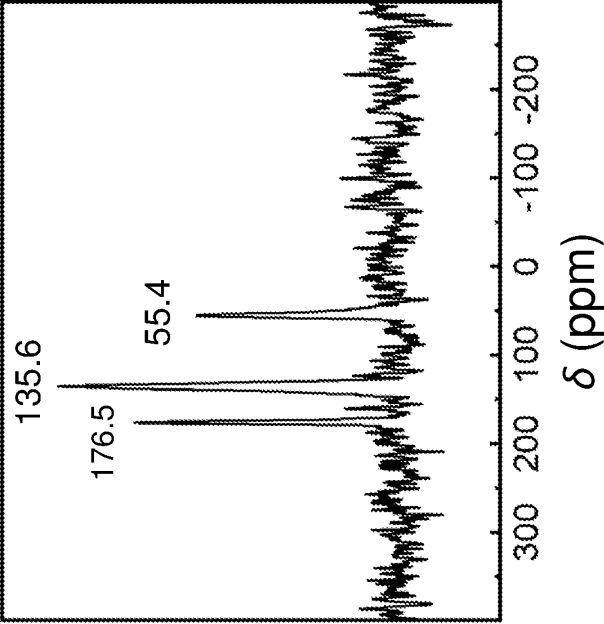


FIG. 49C

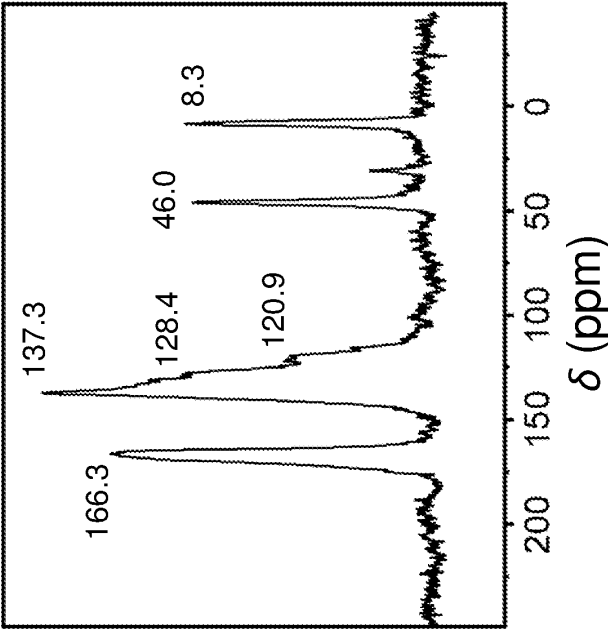


FIG. 49D

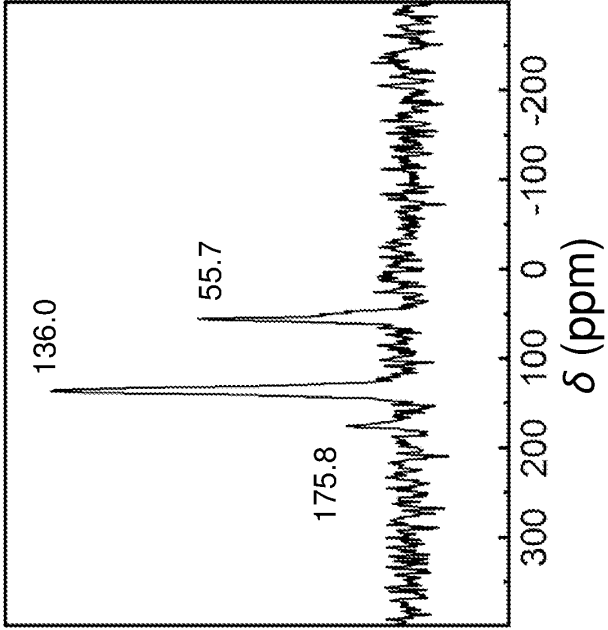
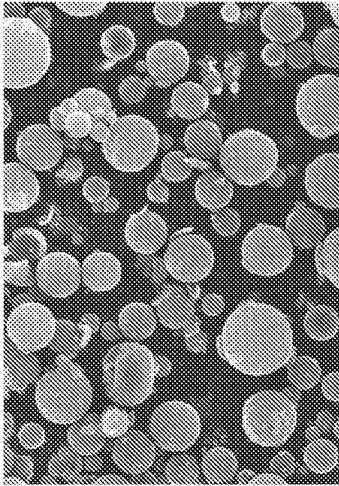
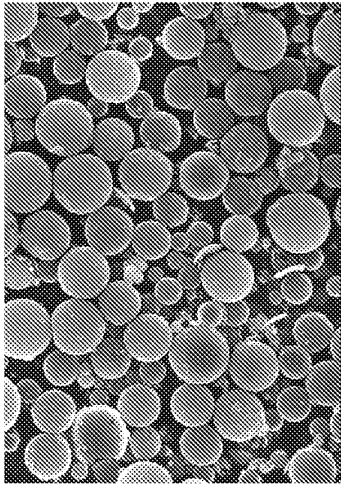


FIG. 50A



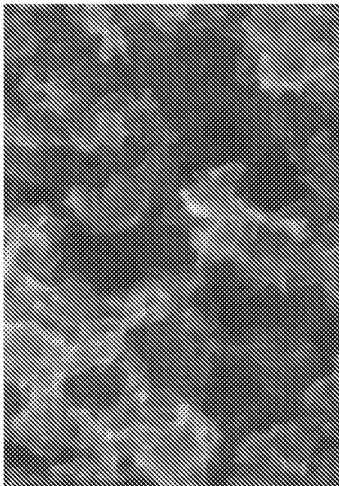
15.0 kV x2k 20 μm

FIG. 50C



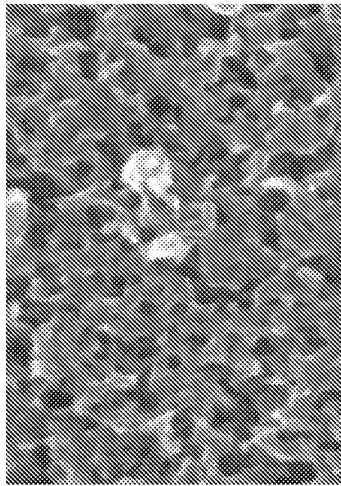
15.0 kV x2k 20 μm

FIG. 50B



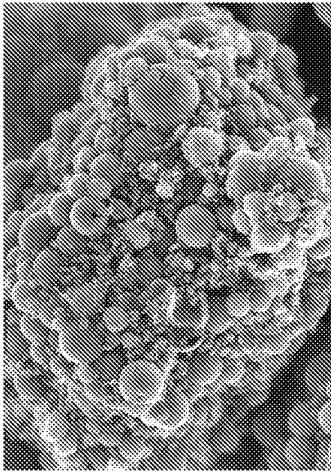
15.0 kV x300k 100 nm

FIG. 50D



15.0 kV x300k 100 nm

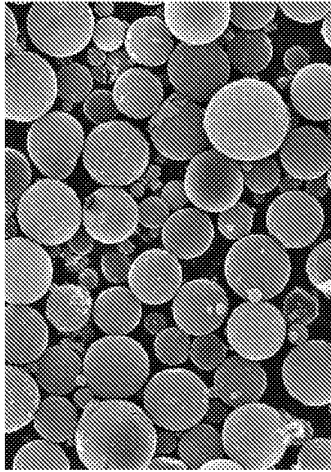
FIG. 51A



15.0 kV x2k

20 μm

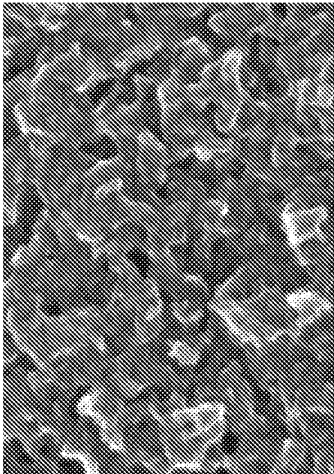
FIG. 51C



15.0 kV x2k

20 μm

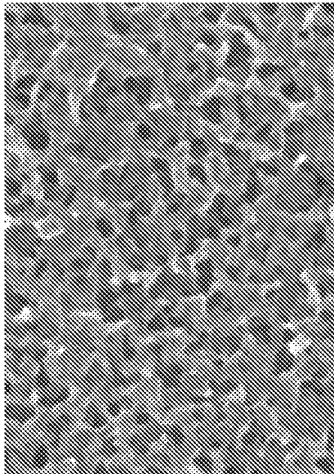
FIG. 51B



15.0 kV x300k

100 nm

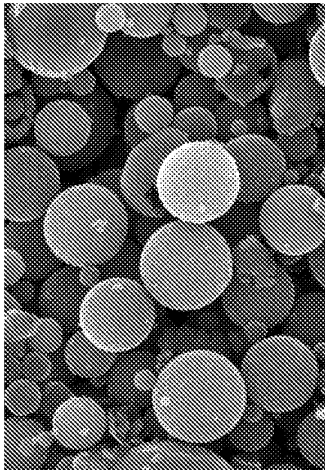
FIG. 51D



15.0 kV x300k

100 nm

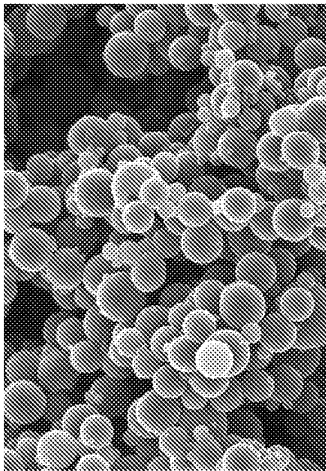
FIG. 52A



15.0 kV x5k

10 μm

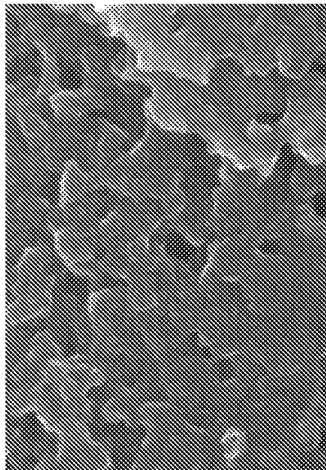
FIG. 52C



15.0 kV x2k

20 μm

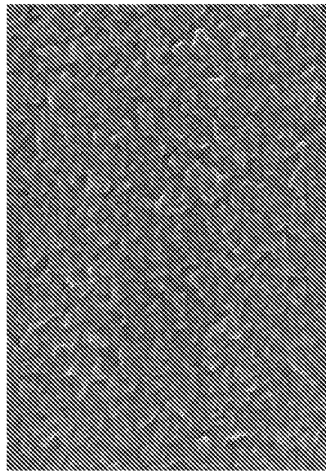
FIG. 52B



15.0 kV x150k

300 nm

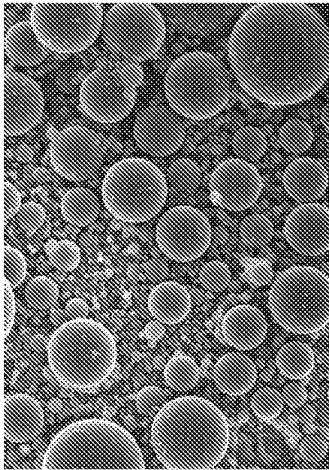
FIG. 52D



15.0 kV x150k

300 nm

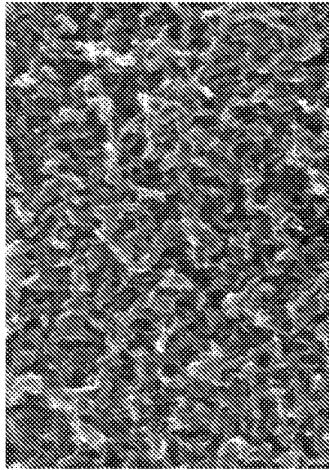
FIG. 53A



15.0 kV x1k

50 μm

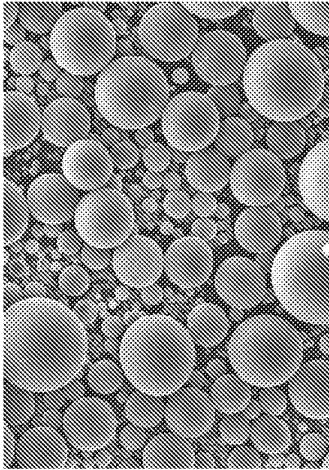
FIG. 53B



15.0 kV x150k

300 nm

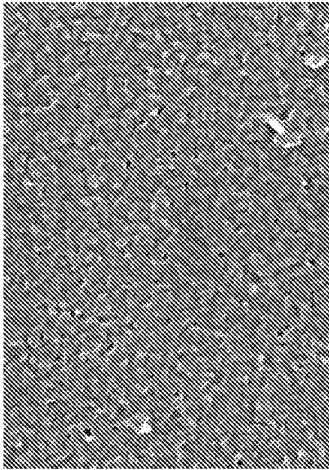
FIG. 53C



15.0 kV x500

100 μm

FIG. 53D



15.0 kV x150k

300 nm

FIG. 54A

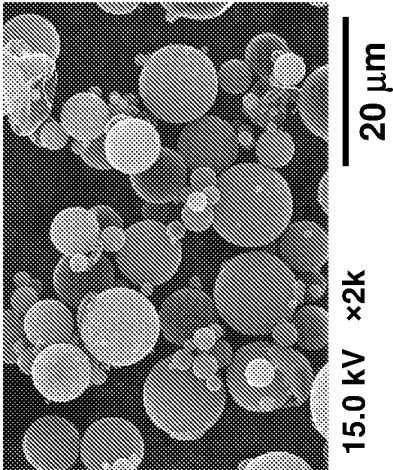


FIG. 54B

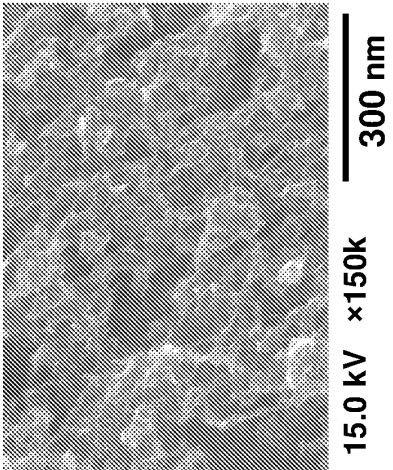


FIG. 54C

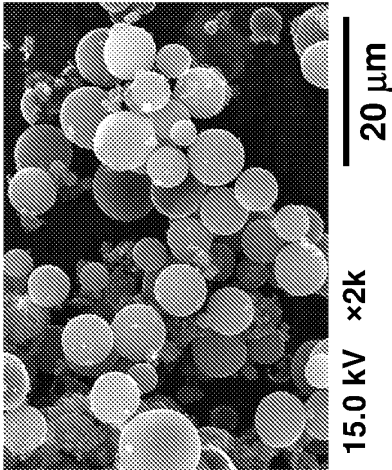
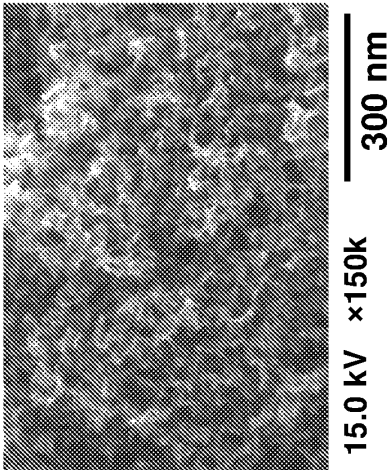


FIG. 54D



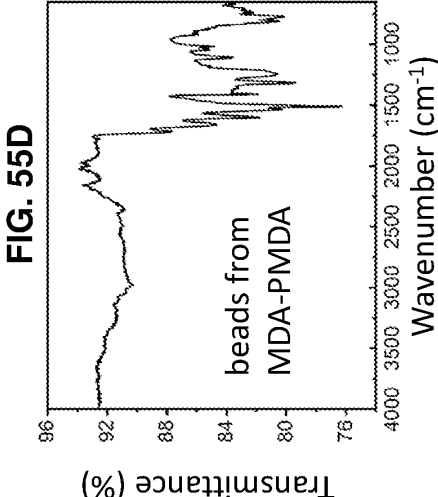
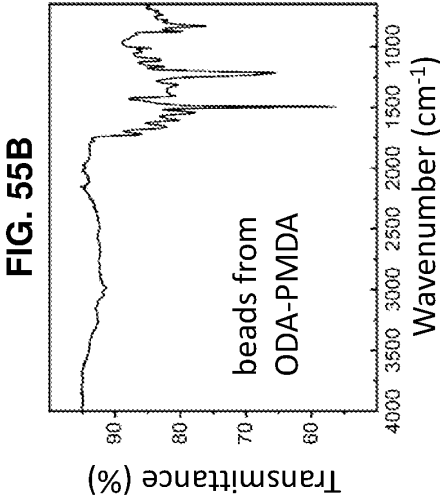
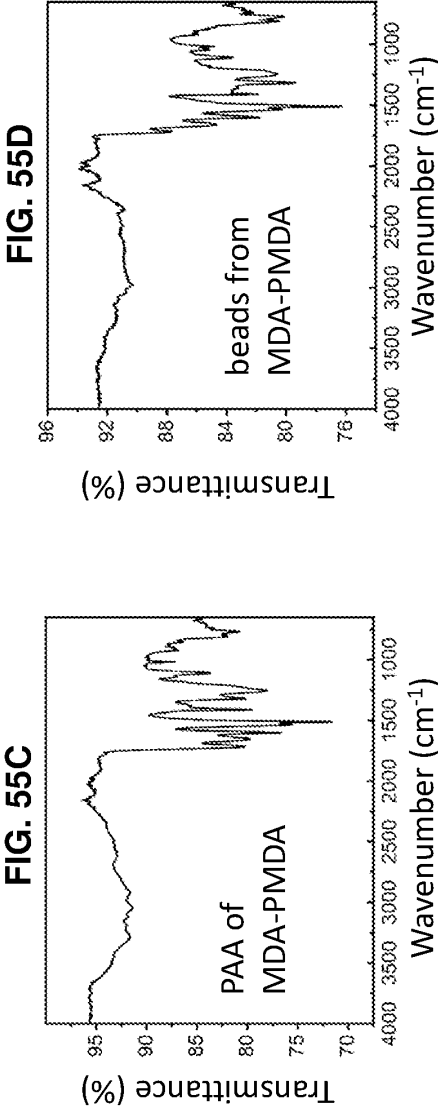
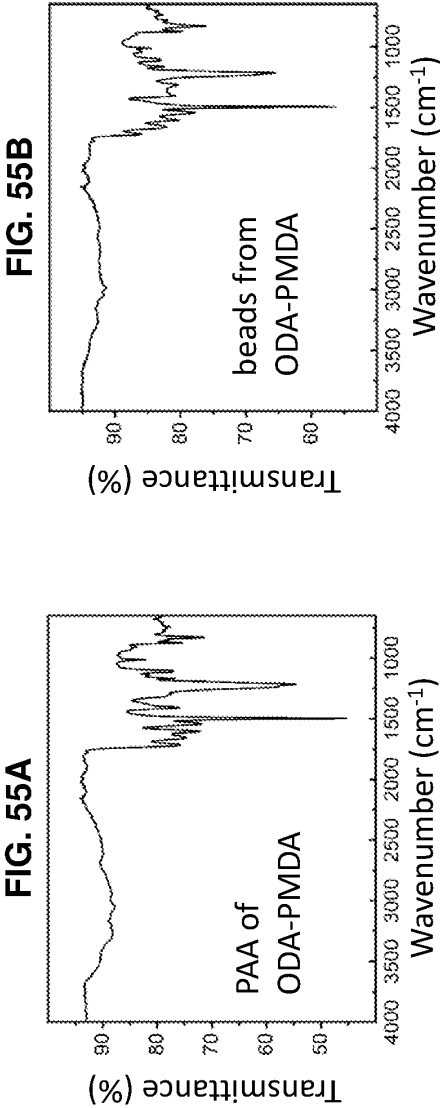


FIG. 56A

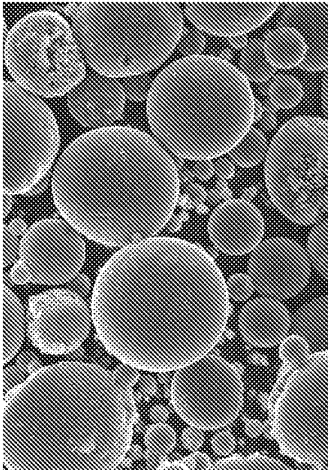


FIG. 56B

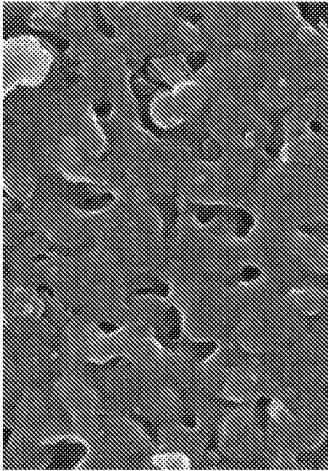


FIG. 56C

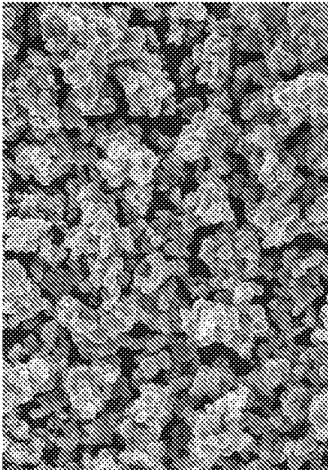


FIG. 56D

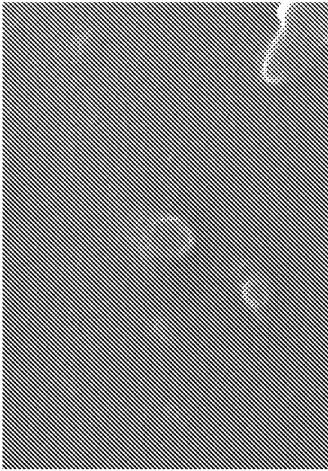
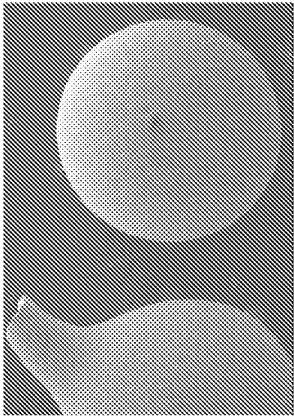


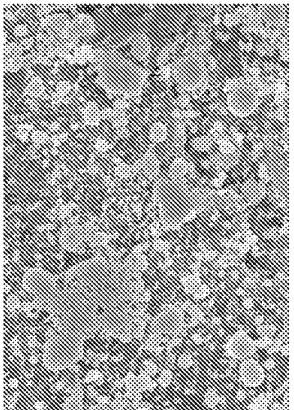
FIG. 57A



15.0 kV x35

1 mm

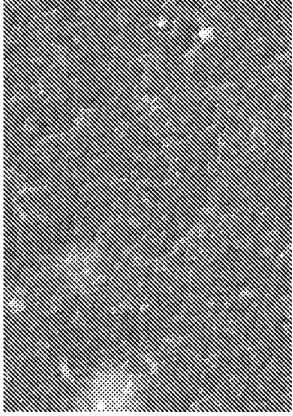
FIG. 57B



15.0 kV x8k

5 μm

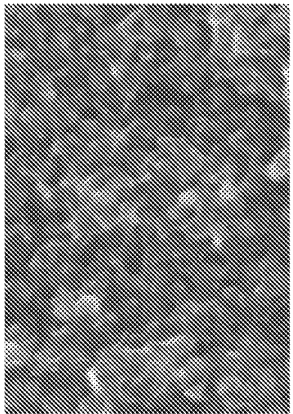
FIG. 57C



15.0 kV x50k

1 μm

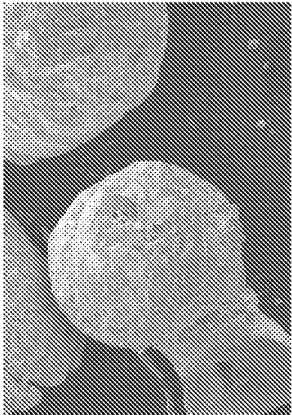
FIG. 57D



15.0 kV x350k

100 nm

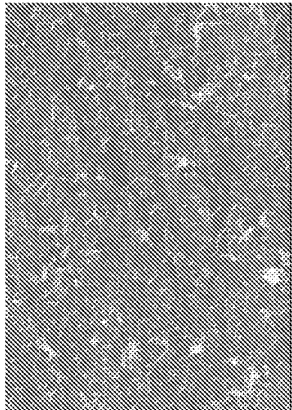
FIG. 58A



15.0 kV x35

1 mm

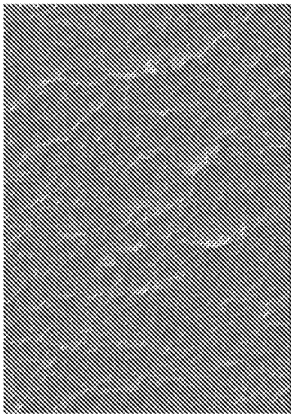
FIG. 58B



15.0 kV x8k

5 μm

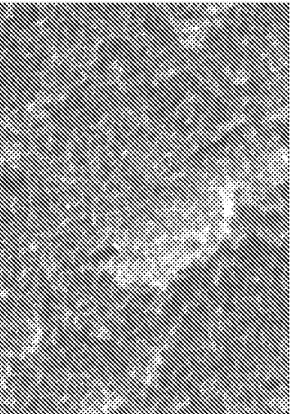
FIG. 58C



15.0 kV x50k

1 μm

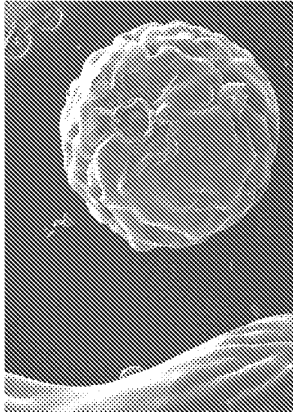
FIG. 58D



15.0 kV x250k

200 nm

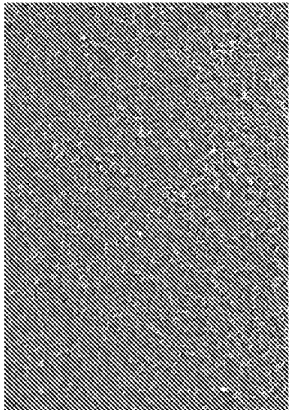
FIG. 59A



15.0 kV x35

1 mm

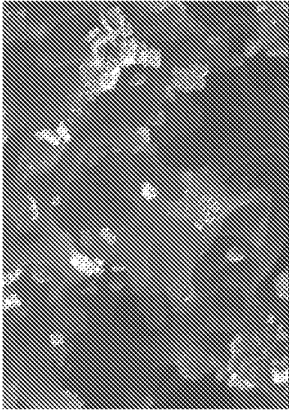
FIG. 59B



15.0 kV x8k

5 μm

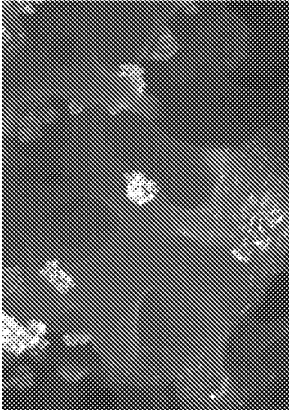
FIG. 59C



15.0 kV x50k

1 μm

FIG. 59D



15.0 kV x100k

500 nm