Claims

What is claimed is:

1. A hollow electrospun fiber assembly, comprising multiple fibers having nanoscale hair like structures extended from inner surface thereof.

2. The hollow electrospun fiber assembly of Claim 1, wherein the hairy like structure has a length ranging from 100 nm to 1μm.

3. The hollow electrospun fiber assembly of Claim 1, wherein the hairy like structure has an aspect ratio of up to 20:1.

4. The hollow electrospun fiber assembly of Claim 1, wherein the surface coverage of the hair-like structure is about 10% to about 80%.

5. The hollow electrospun fiber assembly of Claim 1, wherein the fibers have pores on the surface having a size ranging from 5 nm to 1μm.

6. The hollow electrospun fiber assembly of Claim 1, wherein the fibers are composed of a polymer selected from a group consisting of ethylene oxide, polyethylene oxide (PEO), ethylene glycol, polyethylene glycol (PEG), poly(lactic acid) (PLA), poly(glycolic acid) (PGA), nylon, polyesters, polyamides, poly(amino acids), polyimides, polyethers, polyketones, polyurethanes, polycaprolactones, polyacrylonitriles, polyaramides, conjugated polymers, poly(2-methoxy, 5 ethyl (2′ hexyloxy) para-phenylene vinylene) (MEH-PPV), polyphenylenevinylenes, polyarylene-vinylenes, polythienolene-vinylenes, polypyrrolo-vinylenes, polyheteroarylene-vinylenes, polyanilines, polyphenylenes, polyarylenes, polythiophenes, polypyrroles, polyheteroarylenes, polyphenylene-ethynylenes, polyarylene-ethynylenes, polythieno-ethynylenes, polyheteroarylene-ethynylenes, and mixtures thereof.

7. The hollow electrospun fiber assembly of Claim 1, wherein the fiber has a core-shell structure, wherein the core is composed of a mixture of PLA, PEO and PEG.

8. The hollow electrospun fiber assembly of Claim 1, wherein the length-to-diameter (outer) ratio (L/d) of a fiber is larger than about 20.

9. A microtube array membrane (MTAM) comprising one or more layers of hollow electrospinning fiber assembly of claim 1.

10. The MTAM of Claim 9, which comprises at least two layers of the fiber assembly.

11. The MTAM of Claim 9, which has a structure wherein the layers of fibers are alternatively or perpendicularly arranged.

12. A pocket enclosing the ~~MTMA~~hollow electrospun fiber assembly of Claim 1.

13. A pocket enclosing the ~~MTMA~~MTAM of Claim 9.

14. A method of using a hollow electrospun fiber assembly of claim 1 in drug screening, matrix form cell cultivation, fermentation, tissue engineering, drug screening or filtration.

15. A method of using MTAM of claim 9 in drug screening, matrix form cell cultivation, fermentation, tissue engineering, drug screening or filtration.