FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
AND
THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

(See Section 10; rule 13)

TITLE OF THE INVENTION

"METHODS OF FORMING ARRAYS OF FUEL CELLS ON A COMPOSITE SURFACE"

APPLICANT

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The following specification particularly describes
the invention and the manner in which
it is to be performed

CLAIMS

What is claimed, is:

1. A method of manufacturing a fuel cell array, the method comprising:

providing a composite layer and a first coating, wherein the composite layer includes a first surface and a second surface and the first coating is disposed over at least a portion of the first surface; and

selectively removing portions of the first coating to form discontinuity regions at predetermined positions in the first coating.

2. The method of Claim 1, wherein the composite layer includes a plurality of discrete dielectric components and a plurality of discrete electron conducting components extending from the first surface to the second surface.

3. The method of Claim 2, wherein one or more of the plurality of discrete dielectric components extend from the first surface to the second surface.

4. The method of Claim 2, wherein the plurality of dielectric components include at least one ion-conducting component.

5. The method of Claim 1, wherein one or more of the discontinuity regions overlie a dielectric component.

6. The method of Claim 1, wherein the first coating includes a layer of catalyst material, a layer of electrode material, a sheet that is impregnated or laminated with a non-porous material, a plastic sheet impregnated with one or more electrical conductive particles, a layer of dielectric material, porous media, a performance enhancing layer, or combinations thereof.

7. The method of Claim 1, wherein the first coating includes platinum, platinum black, carbon supported platinum, palladium, copper, nickel, gold, carbon fiber paper, carbon paper, carbon black, carbon powder, graphite powder, expanded graphite, or combinations thereof.

8. The method of Claim 1, wherein a second coating is disposed over at least a portion of the second surface and the method includes selectively removing portions of the second coating to form discontinuity regions at predetermined positions in the second coating.

9. The method of Claim 1, wherein a second coating is adjacent to the second surface.

10. The method of Claim 8, wherein the discontinuity regions in the first coating are offset relative to the discontinuity regions in the second coating.

11. The method of Claim 1, wherein a form of energy is used to selectively remove portions of the first coating.

12. The method of Claim 11, wherein the form of energy is a laser.

13. The method of Claim 12, wherein the laser has a wavelength of between about 200 and about 400 nanometers.

14. The method of Claim 1, wherein a stream of matter is used to selectively remove portions from the first coating.

15. The method of Claim 1, wherein a mask is aligned with the composite layer before portions of the first coating are selectively removed.

16. The method of Claim 1, wherein a mechanical tool is used to selectively remove portions of the first coating.

17. The method of Claim 16, wherein the tool removes portions of the first coating by cutting, scribing, scoring, shaving, scraping, shearing, or cleaving.

18. The method of Claim 16, further including overlaying a mask on the first coating before selectively removing portions of the first coating with the mechanical tool.

19. The method of Claim 1, further including aligning a material-removal implement with the first coating or the composite layer before selectively removing portions of the first coating.

20. The method of Claim 19, further including identifying or forming fiduciary marks on the composite layer or the first coating prior to aligning the material-removal implement with the first coating or the composite layer.

21. The method of claim 19, wherein selectively removing portions of the first coating includes using at least two tools in a defined sequence.

22. The method of Claim 1, wherein the discontinuity regions have a width of between about 75 and 115 micrometers.

23. The method of Claim 1, wherein selectively removing portions of the first coating forms an array of discrete electrodes on the composite layer.

24. The method of Claim 23, wherein discontinuity regions have a width sufficient to provide an insular break between adjacent electrodes.

25. The method of Claim 1, wherein the first coating is adjacent to the first surface.

26. The method of Claim 1, wherein one or more of the discontinuity regions extend to the first surface.

27. The method of Claim 1, wherein a third coating is disposed between at least a portion of the first coating and the first surface.

28. The method of Claim 27, further including selectively removing portions of the third coating to form discontinuity regions in the third coating.

29. A method of manufacturing a planar fuel cell array, the method comprising:

providing a planar composite layer and a first coating, wherein the composite layer includes a first surface, a second surface, a plurality of discrete ion exchange components extending from the first surface to the second surface, and a plurality of discrete electron conducting components extending from the first surface to the second surface, and wherein the first coating is disposed over at least a portion of the first surface; and

selectively removing portions of the first coating to form discontinuity regions at predetermined positions in the first coating.

Dated this 21 day of April 2014

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