METHOD TO MAKE CONDUCTIVE HYDROPHILIC FUEL CELL ELEMENTS

A flow field plate for a fuel cell that has one or more outer layers that makes the plate more conductive and hydrophilic. In one embodiment, the coating is co-deposited as combination of a conductive material and a metal oxide coating. A suitable conductive material is gold and suitable metal oxides include SiO₂, HFO₂, ZrO₂, Al₂O₃, SnO₂, Ta₂O₅, Nb₂O₅, MoO₃, IrO₂, RuO₂ and mixtures thereof. The conductive material and metal oxide can also be deposited as two separate layers, where the metal oxide is the outer layer. According to another embodiment, a metal layer is deposited on the plate with nanopores that provide the hydrophilicity. Also, doping ions can be added to the metal oxide to provide low fluoride solubility of the coating to control the rate that hydrofluoric acid etches away the oxide layer.

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INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
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IPC(3): H01M 2/14 (2007.01), H01M 2/00 (2007.01); H01M 8/10 (2007.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
USPC: 429/38, 34; 30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 429/38, 34; 30 (see key words below)

Electronic database consulted during the international search (name of database and, where practical, search terms used)
Electronic Databases Searched: USPTO WEST (PGPUB, EPAB, JPAB, USPT). Google patent, Thomson dialog. Search Terms Used: steel or titanium or aluminum, gold, hydrophilic, conductive. Oxide, plate, thick3, doping, nanopores, binder, polymer

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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