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(71) Applicant *(for all designated States except US)*: AEROJET GENERAL CORPORATION [US/US]; Highway 50 at Aerojet Road, Rancho Cordova, CA 95670 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: SPEAR, Reginald, G., Jr. [US/US]; 8516 Longspur Way, Sacramento, CA 95843 (US). MUEGGENBURG, H., Harry [US/US]; 3525 Bluff Court, Carmichael, CA 95608 (US). HODGE, Rex [US/US]; 5101 Bassett Way, Sacramento, CA 95823 (US).

(74) Agents: DULIN, Jacques, M. et al.; Pillsbury Madison & Sutro, Suite 800, Ten Almaden Boulevard, San Jose, CA 95113 (US).

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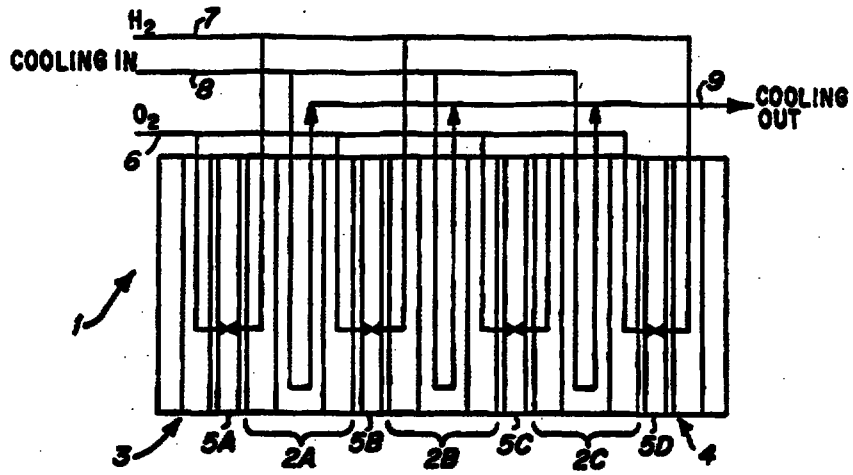
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① PCT Appn & SR

② IPER & Annexes

(54) Title: FUEL CELLS EMPLOYING INTEGRATED FLUID MANAGEMENT PLATELET TECHNOLOGY



FUEL CELL STACK (SIMPLIFIED)

(57) Abstract

Fuel cell stacks (1) comprising stacked separator/membrane, electrode assembly cells in which the separators comprise a series of stacked thin sheet platelets (30-1 and 30-7) having individually configured serpentine micro-channel reactant gas humidification (35, 40), active area (25) and cooling fields therein. The individual platelets are stacked with coordinate features precisely aligned in contact with adjacent platelets and bonded to form a monolithic separator. Post bonding processing includes passivation, such as nitriding. Preferred platelet material is 4-25 mil Ti in which the features, serpentine channels (52), tabs, lands (54), vias (61, 63, 65), manifolds and holes, are formed by chemical or laser etching, cutting, pressing or embossing, with combinations of depth and through-etching being preferred. The platelet manufacturing process is continuous and fast. By employing CAD based platelet design and photolithography, rapid change in feature design can accommodate a wide range of thermal management and humidification techniques. 100 cell H_2-O_2/Air PEM fuel cell stacks of this IFMT platelet design will exhibit outputs on the order of .75 kW/kg, some 3-6 times greater than current graphite plate PEM stacks.