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[038] Figures ~~1~~ **2** to 6 show one form of an electrolysis cell system or electrolyser 100 according to the present invention.

[039] Referring firstly to Figure 2, which shows a process schematic of one electrolysis cell system 100 according to an embodiment of the subject invention. The illustrated electrolysis cell system 100 comprises at least one electrolysis cell 101. Each electrolysis cell 101 includes a membrane electrode assembly 102 having gas permeable electrodes comprising an anode 107 and a cathode 109 which are arranged on either side of an ion conductive electrolyte 108. The membrane electrode assembly 102 is constructed by means well known in the art. For example, in one embodiment of the present invention the electrolysis cell 101 contains a pair of gas porous electrodes pressed on each side of the electrolyte 108.

[040] The electrolyte 108 is preferably either a solid ion exchange membrane (a commercially available proton exchange membrane, for example NAFION® or an anion exchange membrane, for example Tokuyama's A201 available from Tokuyama America : Arlington Heights, IL 60005, United States of America) or a liquid electrolyte embedded in a variety of porous matrixes (for example as described in the US patents 5,843,297 and 4,895,634 the contents of which should be understood to be incorporated into the specification by this reference). The main requirement for the electrolyte 108 is to have a lower saturated water pressure over its surface compared to that of pure water at identical temperature and pressure.

[041] The electrodes for the anode 107 and the cathode 109 are preferably composed of materials well known to catalyse water oxidation and reduction, in either acidic or alkaline medium depending on the type of the electrolyte. For example, the electrodes for the anode 107 and the cathode 109 may either form nanoparticles dispersed on the surface of an ion exchange membrane (as for example described in Energy Environ. Sci., 2011, **4**, 2993 the contents of which should be understood to be incorporated into the specification by this reference), or be manufactured as a perforated sheet or mesh (for example as described in