Fabrication of gas diffusion layer based on x-y robotic spraying technique for proton exchange membrane fuel cell application

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[en] The x-y robotic spraying technique developed in the Universiti Kebangsaan Malaysia is capable of fabricating various sizes of thickness and porosity of gas diffusion layer (GDL) used in the proton exchange membrane fuel cell (PEMFC). These parameters are obtained by varying the characteristic spray numbers of the robotic spraying machine. This investigation results were adequately represented with mathematical equations for hydrogen gas distribution in GDL. Volumetric modulus (M) parameter is used to determine the value of current density produced on the electrode of a single cell PEMFC. Thus the M parameter can be employed as indicator for a successful GDL fabrication. GDL type 4 has three variables of layer design that can be optimized to function as gas distributor, gas storage, flooding preventer on GDL surface, to evacuate water from the electrode and to control the electrical conductivity. The gas distribution in GDL was mathematically represented with average error of 15.5%. The M value of GDL type 4 according to the model was 0.22 cm^3/s and yielded a current density of 750 A/m^2.

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