

CLAIMS

1. A catalyst support layer for proton exchange membrane fuel cells (PEMFCs), comprising:
5 a carbon film comprising biochar derived from water hyacinth (*Eichhornia crassipes*), said biochar having a particle size of approximately 250 micrometers and uniformly mixed with polyvinylidene fluoride (PVDF) binder at a weight ratio of about 50:50.
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2. The catalyst support layer of claim 1, wherein the carbon film has a total surface area of at least 40 square centimeters.
- 15 3. The catalyst support layer of claim 1, wherein the carbon film has a thickness of approximately 0.19 millimeters.
4. The catalyst support layer of claim 1, wherein the carbon film has a mean water contact angle of approximately 120°.
- 20 5. The catalyst support layer of claim 1, wherein the biochar displays X-ray diffraction (XRD) peaks at approximately 28.3°, 40.5°, and 50.16°.
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