Mesh Optimization for Microbial Fuel Cell Cathodes Constructed around Stainless Steel Mesh Current Collectors

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According to the macroporous matrix diffusion model, oxygen transfer coefficient has a linear relationship with porosity of mesh (Figure S1A). There is generally good agreement between experimental and predicted oxygen transfer coefficients. However, there is not a direct relationship between maximum power production and porosity of mesh cathodes (Figure S1A), indicating other factors other than oxygen transfer that dominant the cathode performance.

If we consider fractional open area that affects the oxygen transfer to the cathode catalyst layer, we can draw the same conclusion (Figure S1B). In fact, the size of the mesh openings changes by 440% from fine to coarse, whereas the total open area of the various meshes only changes by 40%. This illustrates the importance of mesh opening size rather than the open area (or similarly the porosity) within each mesh.
Figure S1. Experimental and predicted oxygen transfer coefficient (based on the macroporous matrix diffusion model) of SS mesh cathodes with different sized mesh, and maximum power densities achieved by these cathodes, against (A) mesh porosity, (B) mesh fractional open area.