Supplementary material

Table S1: The performance efficiency (%) of biophotovoltaic (BPV) systems reported in past two decades

BES setup	Anode	Light intensity (Wm^{-2})	Power density (mWm^{-2})	Efficiency (%)	Reference
Single chamber photosynthetic microbial fuel cell	Platinum	6.5	0.132	0.002	[72]
Single chamber photosynthetic microbial fuel cell	Platinum	6.5	5	0.076	[73]
Multichannel BPV with open air cathode	Stainless steel	8	5.05	0.063	[55]
Photo-Microbial fuel cell	Carbon cloth	12.1	0.2	0.001	[59]
Multichannel BPV with open air cathode	Carbon paper	8	2.05	0.025	[55]
Dual chamber microbial fuel cell	Graphite rod	4.5	0.82	0.018	[109]
Photo microbial fuel cell	Graphite rod	2.7	12.947	0.479	[111]
Photo microbial fuel cell	Osmium redox polymer-modified graphite rod	440	481.5	0.001	[118]
Photo bioelectrochemical cell with enzymatic cathode	Multiwalled carbon nanotubes on carbon paper	17.4	35	0.201	[102]
Dual chamber photo microbial fuel cell	Graphite plates	6.5	0.0084	0.00012	[110]
Single chamber BPV with air cathode	Carbon nanotubes	10.9	0.38	0.003	[103]
Single chamber open air BPV	ITO coated PET	50	0.696	0.001	[53]
Single chamber open air BPV	ITO coated PET	10	10	0.1	[29]
Photo microbial fuel cell	FTO coated ceramics	12	14	0.116	[59]
Photo-Microbial fuel cell	FTO coated glass	12	24	0.2	[59]
Multichannel BPV with open air cathode	ITO coated PET	8	23.6	0.295	[55]

Photosynthetic MFC with air cathode	ITO coated glass slide	20	0.0248	0.0001	[128]
Single chamber BPV with open air cathode	ITO coated PET	8.72	0.039	0.0004	[17]
Single chamber BPV with open air cathode	ITO coated glass	6.5	0.313	0.004	[24]
BPV with air cathode	ITO coated PET	109	4.37	0.004	[23]

Power density was calculated by normalizing the power output to the surface area of anode; unit conversion for light intensity was performed according to the coefficient values of Plant Growth Chamber Handbook [79]; efficiency (%) was calculated using the following formula, Efficiency (%) = power output (W m^{-2}) / input of light intensity (W m^{-2}) x 100

Table S2: Insufficient data to calculate performance efficiency (%) of BPV system reported in past two decades

Study	Light intensity	Power density	Efficiency (%)
(Samsonoff et al., 2014)	☐	0.0057 mW m^{-2}	✖
(Cereda et al., 2014)	20 W m^2	☐	✖
(Wei et al., 2016)	☐	8 mW m^{-2}	✖
(Sekar et al., 2016)	80 µmole photons m^2 s^1	10 mA m^{-2}	♦
(Hasan et al., 2017)	40 mW cm^2	☐	✖
(Liu and Choi, 2017)	☐	438 mW m^{-2}	✖
(Li et al., 2019)	49 µmole photons m^2 s^1	1108.9 mW m^{-3}	♦
(Yang et al., 2019)	100 µmole photons m^2 s^1	2.34 W m^{-3}	♦
(Wang et al., 2018)	☐	4.06 mW m^{-2}	✖

Efficiency (%) was calculated in this study using the following formula, Efficiency (%) = power output (W m-2) / input of light intensity (W m-2) x 100; ☐ data not provided; ✖ cannot be calculated due to source providing insufficient data;♦ cannot be calculated due to source only providing current density or power density in non-convertible format