Table S1 Data transformation in this study.

| Factors | Transformation method | Number of cases after screening |
| --- | --- | --- |
| Anode surface area | Y=ln (1+X) | 7028 |
| Cathode surface area | Y=ln (1+X) | 6501 |
| Anode chamber volume | Y=ln (1+X) | 5944 |
| Cathode chamber volume | Y=ln (1+X) | 5309 |
| Total volume of reaction chamber | Y=ln (1+X) | 7292 |
| Battery start-up time | Y=ln (1+X) | 2047 |
| Reaction duration | Y=ln (1+X） | 5176 |
| External resistance | Y=lnX | 5786 |
| pH | Y=X2 | 2486 |
| Cathode pH | Y=lnX | 1014 |
| Temperature | Y=lnX | 4436 |
| Internal Resistance (Ω) | Y=ln (1+X) | 1345 |
| Voltage (mV) | Y=ln (1+X) | 7401 |
| Power (W) | Y=lnX | 177 |
| Power density (W/m3) | Y=ln (1+X) | 1096 |
| Power density (mW/m2) | Y=ln (1+X) | 3165 |
| Coulomb efficiency (%) | Y=X1/2 | 337 |
| Current density (mA/m2) | Y=ln (1+X) | 3071 |
| Current density (A/m3) | Y=ln (1+X) | 1019 |

Table S2 Data transformation of this study in comparison with other meta-analysis or review papers.

|  |  |  |
| --- | --- | --- |
| Factors | Transformation method | Number of cases after screening |
| Operating temperature | - | 4517 |
| Power density (mW/m2) | Y=ln (1+X) | 3311 |
| Power density (W/m3) | Y=ln (1+X) | 1168 |
| Voltage (mV) | Y=ln (1+X) | 7543 |
| Coulomb efficiency (%) | Y=ln (1+X) | 454 |
| Reaction duration | Y=ln (1+X) | 5212 |

Table S3 The individual and interaction effects of different influencing factors on the power generation performance indices.

| Parameters | Voltage (mV) | Power  (W) | Power density (mW/m2) | Power density (W/m3) | coulombic efficiency (%) | Current density (mA/m2) | Current density (A/m3) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| CMA |  |  | **< 0.001** | **< 0.001** | **< 0.001** | **< 0.001** | **0.042** |
| P1 |  |  | 0.065 | **< 0.001** | 0.496 | **< 0.001** | **< 0.001** |
| CMA×P1 |  |  | **< 0.001** | **< 0.001** | 0.093 | 0.125 | **< 0.001** |
| CMA |  |  | **< 0.001** | **< 0.001** | **<0.001** | **< 0.001** | **< 0.001** |
| P2 |  |  | **< 0.001** | **< 0.001** | **<0.001** | 0.849 | **< 0.001** |
| CMA×P2 |  |  | **< 0.001** | **< 0.001** | **<0.001** | 0.799 | **< 0.001** |
| CMA |  |  | **< 0.001** | **< 0.001** | **<0.001** | **< 0.001** | **< 0.001** |
| P3 |  |  | **< 0.001** | **< 0.001** | **<0.001** | 0.434 | **< 0.001** |
| CMA×P3 |  |  | **< 0.001** | **0.003** | **<0.001** | **0.039** | **< 0.001** |
| CCV | **< 0.001** |  | **< 0.001** | 0.119 |  | **< 0.001** | **< 0.001** |
| P1 | **0.026** |  | **< 0.001** | **< 0.001** |  | **0.001** | **0.034** |
| CCV×P1 | **< 0.001** |  | **< 0.001** | **< 0.001** |  | **< 0.001** | **0.001** |
| CCV |  |  |  | **0.001** |  | **< 0.001** |  |
| P2 |  |  |  | 0.146 |  | **< 0.001** |  |
| CCV×P2 |  |  |  | 0.053 |  | 0.182 |  |
| CCV |  |  | **< 0.001** | **0.047** | **<0.001** | **< 0.001** | **< 0.001** |
| P3 |  |  | **< 0.001** | **< 0.001** | **<0.001** | **< 0.001** | **< 0.001** |
| CCV×P3 |  |  | **< 0.001** | **< 0.001** | **<0.001** | **0.019** | **< 0.001** |
| ER | **< 0.001** | **<0.001** | 0.090 |  | 0.291 | **< 0.001** | 0.856 |
| P1 | **< 0.001** | **<0.001** | **< 0.001** |  | **<0.001** | **< 0.001** | **< 0.001** |
| ER×P1 | **< 0.001** | **<0.001** | **< 0.001** |  | **<0.001** | **< 0.001** | **< 0.001** |
| ER | **< 0.001** |  | 0.852 |  |  | **< 0.001** | **< 0.001** |
| P2 | **0.001** |  | **< 0.001** |  |  | **< 0.001** | **< 0.001** |
| ER×P2 | **< 0.001** |  | **< 0.001** |  |  | **< 0.001** | **< 0.001** |
| ER | **< 0.001** | **0.003** | 0.151 |  | 0.486 | **< 0.001** |  |
| P3 | 0.343 | **0.028** | **< 0.001** |  | 0.315 | **< 0.001** |  |
| ER×P3 | 0.542 | **0.035** | **< 0.001** |  | 0.263 | **< 0.001** |  |
| RD | **< 0.001** |  | **< 0.001** | **< 0.001** |  | **< 0.001** | **< 0.001** |
| P1 | 0.777 |  | **< 0.001** | **< 0.001** |  | **< 0.001** | **< 0.001** |
| RD×P1 | **0.023** |  | **< 0.001** | **< 0.001** |  | **0.014** | **< 0.001** |
| RD | **< 0.001** |  | **< 0.001** | **< 0.001** |  | 0.588 | **< 0.001** |
| P2 | **< 0.001** |  | **0.002** | **0.032** |  | **0.004** | 0.304 |
| RD×P2 | **< 0.001** |  | **0.017** | **< 0.001** |  | **0.004** | 0.586 |
| RD | **0.001** |  | 0.859 | **< 0.001** |  | 0.062 | **< 0.001** |
| P3 | **0.043** |  | **< 0.001** | **< 0.001** |  | 0.552 | **< 0.001** |
| RD×P3 | **0.019** |  | **< 0.001** | **< 0.001** |  | **0.002** | **< 0.001** |
| BIR |  |  |  | **0.001** |  |  |  |
| P1 |  |  |  | 0.594 |  |  |  |
| BIR×P1 |  |  |  | 0.560 |  |  |  |
| BIR |  |  |  | **0.024** |  |  |  |
| P2 |  |  |  | **< 0.001** |  |  |  |
| BIR×P2 |  |  |  | **< 0.001** |  |  |  |
| BIR |  |  |  | **< 0.001** |  |  |  |
| P3 |  |  |  | 0.379 |  |  |  |
| BIR×P3 |  |  |  | 0.339 |  |  |  |
| BST |  |  |  | **< 0.001** |  |  |  |
| P1 |  |  |  | **< 0.001** |  |  |  |
| BST×P1 |  |  |  | **< 0.001** |  |  |  |

Note: P1 means whether to perform pretreatment, P2 means Reaction chamber type, P3 means Substrate type, CMA means cathode material area, CCV means cathode chamber volume, ER means external resistance, RD means reaction duration, BIR means battery internal resistance, BST means battery startup time

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Voltage  (mV) | Power  (W) | Power Density  (mW/m2) | Power Density  (W/m3) | Coulombic efficiency  (%) | Current density  (mA/m2) | Current density  (A/m3) |
| Anode material area  (cm2) | 0.065 (4615)\*\*\* | -0.120 (32)ns | -0.282 (2334)\*\*\* | 0.251 (609)\*\*\* | -0.507 (199)\*\*\* | -0.448 (2097)\*\*\* | -0.243 (510)\*\*\* |
| Cathode material area  (cm2) | 0.006 (4375)ns | 0.313 (41)\* | -0.284 (2280)\*\*\* | 0.232 (561)\*\*\* | -0.529 (196)\*\*\* | -0.446 (2038)\*\*\* | 0.179 (496)\*\*\* |
| Anode chamber volume  (mL) | 0.068 (3968)\*\*\* | 0.955 (44)\*\*\* | -0.277 (1651)\*\*\* | 0.295 (865)\*\*\* | -0.658 (189)\*\*\* | -0.341 (1649)\*\*\* | -0.103 (614)\*\* |
| Cathode chamber volume  (mL) | 0.069 (3511)\*\*\* | 0.493 (51)\*\*\* | -0.325 (1428)\*\*\* | 0.146 (725)\*\*\* | -0.656 (185)\*\*\* | -0.403 (1517)\*\*\* | -0.270 (369)\*\*\* |
| Reaction chamber volume  (mL) | -0.093 (4728)\*\*\* | 0.416 (109)\*\*\* | -0.410 (2069)\*\*\* | -0.169 (940)\*\*\* | -0.097 (159)ns | -0.394 (2110)\*\*\* | -0.421 (873)\*\*\* |
| Battery start-up time (d) | -0.023 (1533)ns |  | -0.063 (419)ns | 0.000 (292)ns | 0.659 (174)\*\*\* | 0.115 (407)\*\* | -0.040 (106)ns |
| Reaction duration (h) | 0.104 (4029)\*\*\* | -0.771 (78)\*\*\* | -0.212 (568)\*\*\* | 0.767 (188)\*\*\* | 0.013 (82)ns | -0.198 (626)\*\*\* | 0.623 (85)\*\*\* |
| External resistance (Ω) | 0.248 (4356)\*\*\* | -0.644 (54)\*\*\* | -0.028 (1608)ns | 0.002 (491)ns | -0.196 (293)\*\* | 0.305 (1470)\*\*\* | -0.271 (540)\*\*\* |
| pH | 0.011 (1856)\*\*\* |  | 0.523 (487)\*\*\* | -0.116 (313)\* | 0.851 (80)\*\*\* | 0.309 (805)\*\*\* | -0.070 (271)ns |
| Temperature (℃) | 0.020 (2944)ns | -0.100 (60)ns | -0.080 (1384)\*\* | 0.111 (672)\*\* | 0.116 (157)ns | -0.081 (1409)\*\* | 0.009 (755)ns |
| Internal Resistance (Ω) | 0.028 (836)ns |  | -0.170 (701)\*\*\* | -0.385 (241)\*\*\* | 0.185 (115)\* | 0.258 (736)\*\*\* | -0.286 (57)\*\* |

Table S4 Results of correlation analyses between MFC power generation performance indices and device configurations and reaction conditions.

Note: Data are shown as correlation coeffieient and number of cases (in parentheses). \* P<0.05, \*\* P < 0.01, \*\*\* P < 0.001, ns not significant.

Appendix Ⅰ: References used in the meta-analysis to build the database (in Chinese).

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Appendix Ⅱ: References used in the comparison with this study

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