

***Figure S1. ImageJ porosity analysis, original photo (a), porosity area (b).***



***Figure S2 Multi-layer laser sintered PEI specimens***

***Table SI. Porosity analysis of single layer PEI***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Power(W)** | **Speed(mm/s)** | **Energy density** | **Total Area(μm2)** | **Average Size(μm2)** | **%Area** |
| **9** | **362.3** | **0.046** | **3816882.075** | **9447.728** | **43.75** |
| **13** | **523.3** | **0.046** | **3618927.111** | **9399.811** | **41.67** |
| **20** | **805.2** | **0.046** | **2711668.252** | **10080.551** | **31.29** |
| **9** | **308.6** | **0.054** | **3117435.496** | **8448.335** | **35.65** |
| **13** | **445.8** | **0.054** | **3078016.987** | **10158.472** | **35.28** |
| **20** | **685.9** | **0.054** | **2741567.809** | **8257.734** | **31.42** |
| **9** | **267.9** | **0.062** | **3093304.742** | **7193.732** | **35.22** |
| **13** | **386.9** | **0.062** | **1798728.796** | **4553.744** | **20.44** |
| **20** | **595** | **0.062** | **1969587.936** | **3931.313** | **22.28** |
| **9** | **238.1** | **0.07** | **2311763.032** | **5882.349** | **26.62** |
| **13** | **343.9** | **0.07** | **1101928.049** | **5272.383** | **12.63** |
| **20** | **529.1** | **0.07** | **1713902.88** | **5026.108** | **19.73** |
| **9** | **213.7** | **0.078** | **2883107.673** | **7101.25** | **33.12** |
| **13** | **308.6** | **0.078** | **1460220.586** | **3126.811** | **16.85** |
| **20** | **474.8** | **0.078** | **2466795.352** | **4827.388** | **28.09** |

***Table SII.*** *porosity analysis on energy density of 0.062 J/mm2*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Power(W) | Speed(mm/s) | Energy density | Total Area(μm2) | Average Size(μm2) | (%) Area |
| 9 | 267.9 | 0.062 | 3093304.742 | 7193.732 | 35.224 |
| 11 | 327.4 | 0.062 | 2253830.587 | 5193.158 | 25.949 |
| 13 | 386.9 | 0.062 | 1798728.796 | 4553.744 | 20.436 |
| 15 | 446.4 | 0.062 | 2047022.591 | 5933.399 | 23.41 |
| 20 | 595 | 0.062 | 1969587.936 | 3931.313 | 22.278 |
| 30 | 892.86 | 0.062 | 1663862.87 | 4850.912 | 23.071 |