**Supplementary Table**

Table S1. Output Voltage and Pattern Characteristics of PENG devices

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Pattern | Diameter (mm) | Pile Spacing (mm) | Output Voltage (V) | Signal Characteristic |
| Aligned | 1.0 | 0.4 | 1.89 V | Irregular |
| Staggered | 0.667 | 0.68 V | Cyclic |
| Aligned | 1.5 | 0.4 | 1.23 V | Irregular |
| Staggered | 0.764 | 0.0146 V | Cyclic |