**Supplementary material**



**S.M.1.** Coating principle of magnetron sputtering equipment



**S.M.2.** Self-developed insulation testing system

**S.M.3.** Insulation materials

|  |  |  |
| --- | --- | --- |
| Insulation materials | Temperature difference (The temperature of the treated sample- The temperature of the blank sample)/℃ | Reference |
| Ag/TiO2/PSA | 9.75 | This paper |
| ZAO/CNTAs/PI | 3(60s) | 32 |
| Ag/TiO2/glass | 5.2 | 33 |