**Supplementary Material (ESI) for**

**Optoelectronic Properties of Porous Silver Oxide Thin Film: Oxidation Time Influence**

**Ahmad Al-Sarraj1, Khaled M. Saoud2\*, Abdelaziz Elmel1, Said Mansour3, Yousef Haik1\***

1. College of Science and Engineering, Hamad Bin Khalifa University, Qatar Foundation, Doha, Qatar.
2. Liberal Arts and Science Program, Virginia Commonwealth University in Qatar, Doha, Qatar.
3. Qatar Energy and Environment Research Institute, Hamad Bin Khalifa University, Qatar Foundation, Doha, Qatar.

Experimental setup for ultrasonic spraying deposition and Oxygen plasma etching techniques are shown Fig. S1. An aqueous solution of silver NWs with a diameter of 50 nm and a length is 100-200 μm is dispersed in 25 mL of ethanol. Ag NWs solution with concentration 20 mg/mL is diluted with ethanol to achieve homogeneous deposition and prevent the NWs from clogging the nozzle during the spraying. The solution then sprayed using the ultrasonic spraying deposition technique on 25x75mm glass substrates. The spraying system is consisting of an impact nozzle, heating plate, and a syringe with a stirrer to pump the solution into the nozzle. The system deposits the silver on the substrate in the form of tiny droplets (size range in microns) to ultrasonically form piezoelectric crystals. The size of the droplets is controlled by the crystals mean frequency of oscillation. Pumped gas (nitrogen) then drive the droplets onto the substrate to create a thin film. The flow rate was adjusted to 0.8 m/L per second, while the air shaping pressure placed at 0.7 CMM. The silver NWs is oxidized using radio-frequency plasma source Plasma etch® model PE-100. A radiofrequency plasma power was adjusted to 30 W and then applied to the silver film under oxygen plasma etching with a mass flow of 15 Sccm. The pressure inside the chamber was 200 mTor and the temperature inside the chamber set at 30 degrees Celsius.

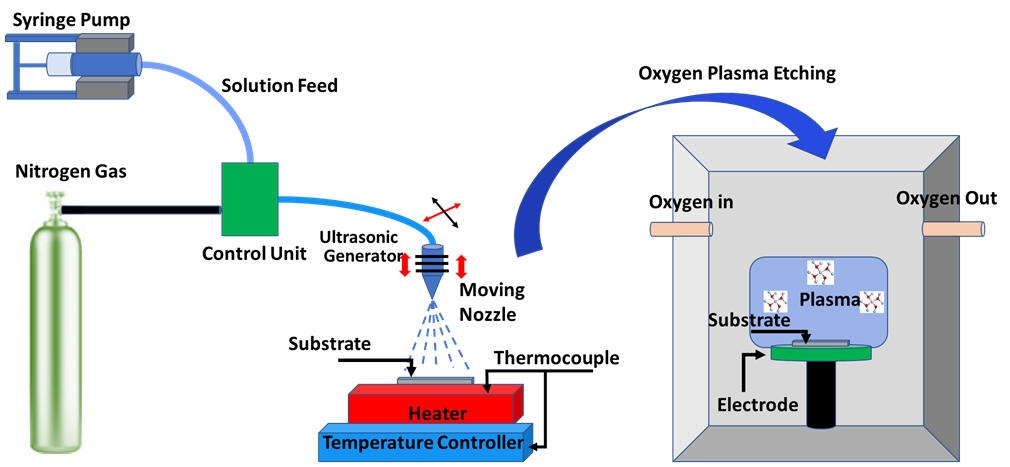


Figure S 1: Schematic illustration of the ultrasonic spray-pyrolysis system and Oxygen plasma etching techniques used the preparation of silver oxide thin film. the present study