**Session Title**: Water Energy Harvesting

**Introduction**:

Considering that over 75% of carbon emissions arise from electricity generation using fossil fuels, an emerging concept for achieving carbon neutrality involves the development of eco-friendly “self-powering” devices. These devices would be able to harness energy from various renewable sources, including but not limited to photovoltaics, thermoelectrics, piezoelectrics, and triboelectrics, rather than relying solely on the grid for power. However, electricity generation from renewable resources has often been limited by unstable outputs or specific requirements for a working environment. Notable efforts have been devoted to revisiting water energy as water is one of the most abundant and ubiquitous renewable sources covering more than 70% of the earth’s surface. For example, the ocean is expected to produce more than 32,000 TWh of energy every year, which is three orders of magnitude higher than global energy consumption. Further, the annual atmospheric moisture energy has been estimated to total over 0.5 TW assuming that 5.05 X 105 km3 of water precipitation in the atmosphere can be fully converted into electrical energy. This session focuses on state-of-the-art materials, devices, and systems, including piezoelectric, triboelectric, electromagnetic, electrochemistry, and other miscellaneous energy harvesting principles for harnessing omnipresent water energy sources in our daily lives.

**Topics**:

* Triboelectric and electrostatic
* Nanogenerators and power capacitors
* Piezoelectric and ferroelectric
* Moisture electricity generators
* Other all miscellaneous energy harvesting
* Self-powered electronics and sensors

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