

Thermionic converters with smooth and grooved Molybdenum electrodes

Mohamed El-Genk and Yoichi Momozaki

▣ Motivation:

Measure effects of the electrode material (Molybdenum) and surface structure (grooves) on the performance of thermionic converters with 0.5 mm interelectrode gap.

▣ Contributions/Important Results:

-TI converters with smooth Mo emitters are almost twice as efficient as those with tungsten emitters at low emitter temperatures (≤ 1800 K) and cesium vapor pressure (*see figure to the bottom right*). Even at emitter temperature of 1474 K, an efficiency of 13.8% and a power density of 2.3 We/cm^2 are attained.

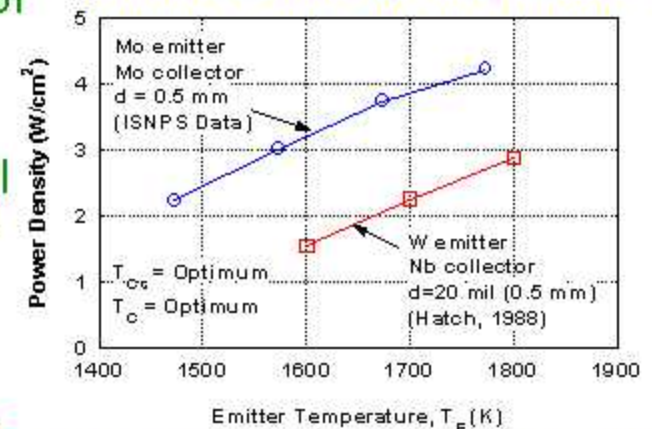
- The performance of converters with grooved Mo electrodes is lower than with smooth electrodes, but still better than with W electrodes at ≤ 1800 K (*see plasma discharge, the top right*)

▣ Applications:

- Topping cycle for terrestrial power plants and in space nuclear reactor and radioisotope power systems



Thermionic converter operating @ 1800 K



Performance comparison of Mo and W emitter converters at different temperatures