

WEST VIRGINIA UNIVERSITY VISIT TO GRC
11/16/2023

LMN - MATERIALS CHEMISTRY & PHYSICS BRANCH

**BASIC RESEARCH IN FUNCTIONAL CERAMICS FOR POWER
AND ENERGY APPLICATIONS**

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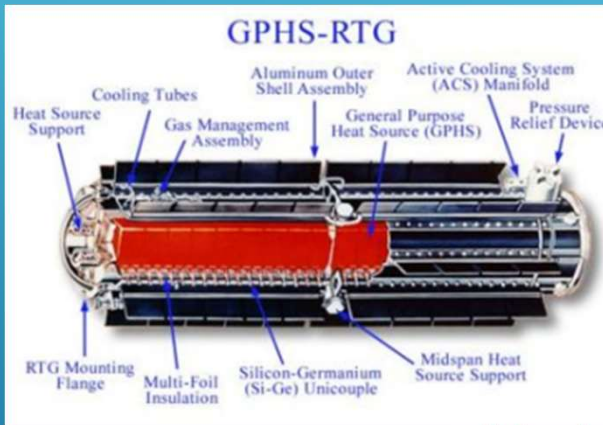
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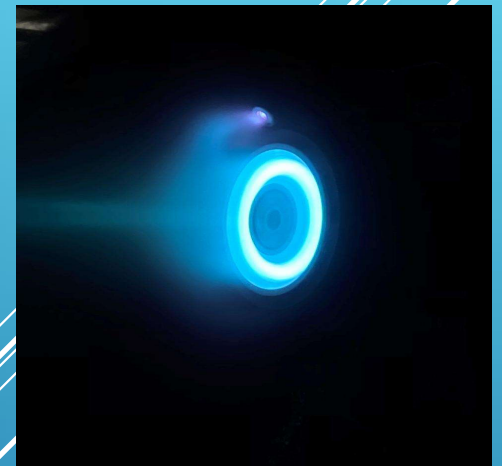
SOFC/SOEC – Lunar/planetary power & ISRU, terrestrial carbon capture & hydrogen economy.

Development of ceramic materials & structures for electrolytes, interconnects, sealants, etc...



Thermoelectrics –
Space/hypersonic heat-to-power conversion.

Micro/nanostructured systems, materials for harsh environments



Electric propulsion - Space exploration.

Thruster cathode materials with improved life & operating requirements

Material Systems of Interest:

- SOFC/SOEC: ZrO_2 , CeO_2 , ABO_3 perovskites such as doped LaCrO_3
- Thermoelectric: $\text{TiO}_2/\text{SnO}_2$, SiGe , $\text{A}_x\text{B}_{4-x}\text{X}_{12-y}\text{X}'_y$ skutterudites such as $\text{Co}_2\text{Ni}_2\text{Sb}_7\text{Sn}_5$
- Ion thruster: BaO , $12\text{CaO} \cdot 7\text{Al}_2\text{O}_3$

Processing Capabilities:

- Solution & solid-state techniques
- Milling, tape/freeze casting, cold/hot pressing, firing (air/inert), directional solidification
- Thin film (PLD)

Characterization:

- Physical
- Thermal
- Electronic/Dielectric
- Crystallographic
- Microstructural