

Advanced Tritium Compatible Materials and Tritium Batteries

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Federal Stakeholders: Natural Resources Canada, Health Canada, Environmental and Climate Change Canada

Objectives

- Demonstrate efficient power production from a tritium-powered device using advanced materials for tritium storage and b-energy conversion
- Develop coatings which prevent tritium permeation in metal components in high-temperature reactor systems
- Develop electrolyser membrane materials compatible with tritium containing environments for tritium separation technology

Tasks Performed

- Combined tritium lights with advanced photovoltaics to produce microwatt power sources; track tritium light intensity over time
- Studied tritium storage in thin films and develop semiconductor for direct betavoltaic power sources
- Exposed membrane materials to high-tritium environments

Achievements and Successes

- Prototype indirect betavoltaic device powered a thermocouple with wireless transmitter
 - Metal films remained intact after hydrogen isotope loading for direct betavoltaics
 - Developed method to determine tritium content of electrolyzer membrane materials
- ### Future Work and Expected Outcomes
- Fabricate tritium powered device able to provide microwatt power
 - Further develop thin-film semiconductors for direct betavoltaics
 - Test additional candidate materials for tritium permeation