Alphavoltaics – the main interest

Developed since 2017, alphavoltaics transform the energy of corpuscular radioactive decay into electric energy. In contrary to other similar emerging technologies, alphavoltaic cells designed by Radium Energy do not rely on semiconductor junctions – this enables them to reach higher efficiencies with a significant increase in robustness. An adaptation towards beta-type radiation is also viable. The cells employ fully enclosed radiation sources, providing maximised safety with the lowest grade of radiological protection needed and maximised market availability. The proof-of-concept tests have been performed using plutonium-239, with current designs employing americium-241 and nickel-63 radiosources. The research performed by Radium Energy includes advanced materials for the use in alphavoltaics, ensuring their constant development and competitiveness.

Article on the efficiency of 2017 proof-of-concept tests

Gammavoltaics – promising experiments

Gammavoltaic cells transform the energy of gamma radiation into electric energy either directly or with an intermediate conversion into visible- of ultraviolet light, illuminating a solar cell - the latter types are grouped into gamma-photovoltaic cells. The proof-of-concept studies on a dehydrated crystalline material converting gamma radiation into electricity using a policrystalline-silicon photovoltaic cell have been performed by Radium Energy in Pripyat, Chornobyl Exclusion Zone, Ukraine, in August 2021. The design proved highly sensitive to high gamma radiation produced by caesium-137 residues. The market-accessible gammavoltaic cell designs are able to employ available enclosed gamma sources, including caesium-137, americium-241, radium-226 and cobalt-60.

Potassium cells – emerging possibilities

Advanced chemical batteries employ the compounds of alcaline metals, which are often expensive or difficult to manufacture. On planet Earth, the 3rd most abundant radioactive isotope is potassium-40, which, in combination with its stable and inexpensive isotopes (potassium-41 and -39), could be employed in classic chemical battery designs, creating radioactively-supported chemical cells - expected to function longer in comparison with its non-radioactive versions. Radium Energy has manufactured a prototype potassium cell in 2021, using 0.0117% concentration of radioactive potassium - along with the preparations to the technology testing of potassium-40 enrichment process.