Radiation Tolerant Electronics with Soft Semiconductors (ROSI)

Initiative: Freigeist-Fellowships

Ausschreibung: Freigeist Kollegium

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Laufzeit: 5 Jahre

Projekt-Website: https://www.uni-potsdam.de/de/pwm/rosi-group

Modern (Opto-) electronics are based on silicon, and although the technology has matured to perfection, the material is imperfect for applications in space, in the vicinity of human-made radiation sources, as well as for medical diagnostics & oncology due to radiation damage, degradation, and device failure. Traditional strategies for radiation-hard electronics rely on harder and harder semiconductors that are, however, scarce and challenging to work with, limiting their today's use. The ROSI project will turn this traditional guideline upside down and develop much softer semiconductors instead. Those possess a more flexible lattice allowing the swift healing of radiation-induced defects, unleashing a novel class of radiation-tolerant materials for a next generation of detectors, electronics, and solar cells that work reliably in harsh radiation environments. Spanning from fundamental research on the radiation tolerance of soft semiconductors, such as halide-based rudorffites, double perovskite, and perovskites, to concrete technologies, the ROSI project will impact a variety of fields. Selecting radiation-tolerant soft semiconductors with large stopping powers for ?- and X-Rays, ROSI will develop next-generation radiation detectors that excel existing technologies in terms of sensitivity. Applications span from sensing, diagnostics, and dosimetry to a next-generation of medical imaging that works with lower doses and offers higher resolution. ROSI will further develop next-generation single- and multi-junction solar cells that are thin yet highly efficient promising ultra-lightweight space photovoltaics (PV) with high specific power (W/g). Processed on thin foils, flexible solar foils that unfold or unroll in space are imaginable. In addition to fundamental research on a library of materials & devices, the ROSI group will develop, build and space-qualify various technology demonstrations in Low-Earth Orbit.

Projektbeteiligte

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Perovskite Organic Tandem Solar Cells.
Understanding and mitigating atomic oxygen-induced degradation of Perovskite solar cells fornear-earth space applications
Ion induced field screening governs the early performance degradation of perovskite solar cells