

Study of InGaAsN/GaAs solar cells in space radiative environment

Maxime LEVILLAYER^{1,2}, Sophie DUZELLIER², Thierry
NUNS², Christophe INGUIMBERT²,
Stéphanie PAROLA³, Alexandre ARNOULT¹, Corinne
AICARDI⁴, Laurent ARTOLA², Guilhem ALMUNEAU¹

¹LAAS-CNRS Toulouse, ²ONERA Toulouse, ³IES-Univ. Montpellier, ⁴CNES

- > How to improve the MJSC efficiency with InGaAsN ?
 - Replacing Ge as the bottom cell : **GaInP/GaAs/1eV**
 - Adding a 4th junction : **GaInP/GaAs/1eV/Ge**

- > Interest for space applications ?
 - Key parameter : W/Kg
 - **Radiation hardness**

- > **Good candidate = 1 eV bandgap InGaAsN lattice matched on GaAs**

> Optimization of Molecular Beam Epitaxial growth

- Bulk and 1-junction solar cells with InGaAsN PIN absorber
- Influence of growth parameters (V/III, temperature) on PL, EQE and Light IV characteristics

> Degradation study of solar cells under ions radiations

- Irradiation campaigns (**Electron and proton**) led in ONERA platform in Toulouse
- Evolution of electric and optical properties before, during and after radiation experiences
- Different behaviours on GaAs and InGaAsN
- Studies on single and tandem III-V solar cells

> Comprehensive study on InGaAsN based solar cells for space PV applications