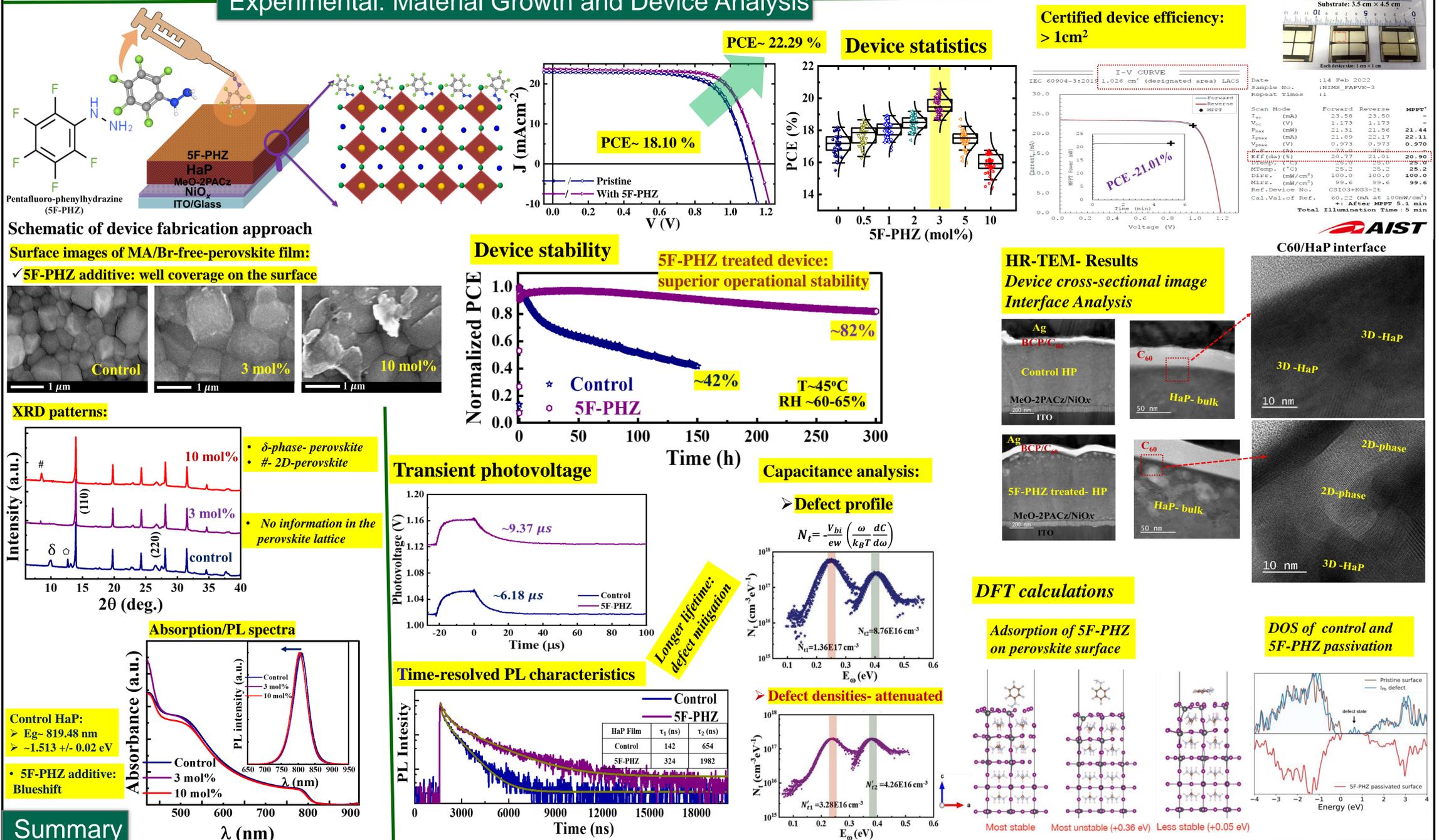


Introduction/Theme under discussion

- Halide perovskite solar cells (PSCs) with state-of-the-art efficiencies consist of thermally unstable methylammonium.
- A molecular surface passivation strategy has been used for the mitigation of surface/bulk defects.
- Large area device and improved operational stability is important for commercialization

- Introduce *penta-fluoro-phenylhydrazine (5F-PHZ)* as a molecular passivator on HP film to improve the optoelectronic properties.
- 5F-PHZ surface treatment quenched the *PbI₂* and *δ*-perovskite phase formed in the pristine film.
- Suppress of defects at surface or grain boundaries in perovskite film as a consequence of stronger halogen bonding with fluoroarene moieties or NH-NH₂ terminal.
- 5F-PHZ passivation is propitious for modification of surface chemistry, interface quality, and moisture tolerability

Experimental: Material Growth and Device Analysis



Summary

- Interface modulation of MA/Br-free HP with fluoroarene functional derivatives
- Attenuate defect densities and suppress ion migration
- Form interfacial embedded 2D-layers
- PCE increase from 18% to > 22% - with superior stability



Ref: (1) D. B. Khadka et al. *Adv. Energy Mater.* 2022, 12, 2202029
(2) D. B. Khadka et al. *ACS Appl. Energy Mater.*, 2021, 4, 11121-11132.
(3) D. B. Khadka et al., *ACS Appl. Mater. Interfaces*, 2019, 11, 7055-7065.
(4) Miyano et al. *J. Phys. Chem. Lett.* 2016, 7, 2240

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