

**The Industrial Revolution in Ultrafast Science****Amplifier Reliability Benefits Transient Absorption Spectroscopy****The Challenge**

Perovskite films are showing great promise for future use in photovoltaic (solar) devices. However, the lifetime of model devices is far short of the requirements for commercial devices. Researchers are looking at compositional and other changes - e.g., varying the hydrophobic content - as potential solutions. To assess their efficacy, it is essential to measure and understand the fundamental photovoltaic behavior, e.g., carrier lifetime, recombination mechanisms, of these modified materials in detail.

**The Solution**

A group led by Professor He Wang at the University of Miami (Miami, FL) is using the Coherent Astrella one-box amplifier to perform transient absorption spectroscopy. This method allows them to follow the fast radiative and non-radiative processes that follow initial photon absorption to study perovskite films in the femtosecond time domain. In their setup, part of the Astrella output pumps an OPA tuned to excite one of the different phases in 2D film samples. The remainder is used to create a white-light continuum that is well-established as a way to capture the absorption spectrum at a specific delay time. The delay time is slowly stepped to obtain time-dependent spectral data. The OPA is then tuned to another wavelength that is resonant with another phase in the sample and the experiment is repeated.

**The Result**

Using this approach, the Wang group has successfully measured the fast charge transfer between different phases, i.e., electron transport between the different layers in the 2D samples. More details are published in: C. Fei, J. S. Sarmiento, H. Wang. "Generation of Coherent Optical Phonon in Methylammonium Lead Iodide Thin Films" *J. Phys. Chem. C*, 2018, 122, 17035.

*"Why are amplifier reliability and stability important? We have several researchers who share this amplifier; it must be ready when someone needs it, whenever that is, and we don't want to waste time optimizing the amplifier."*

—Professor He Wang,  
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