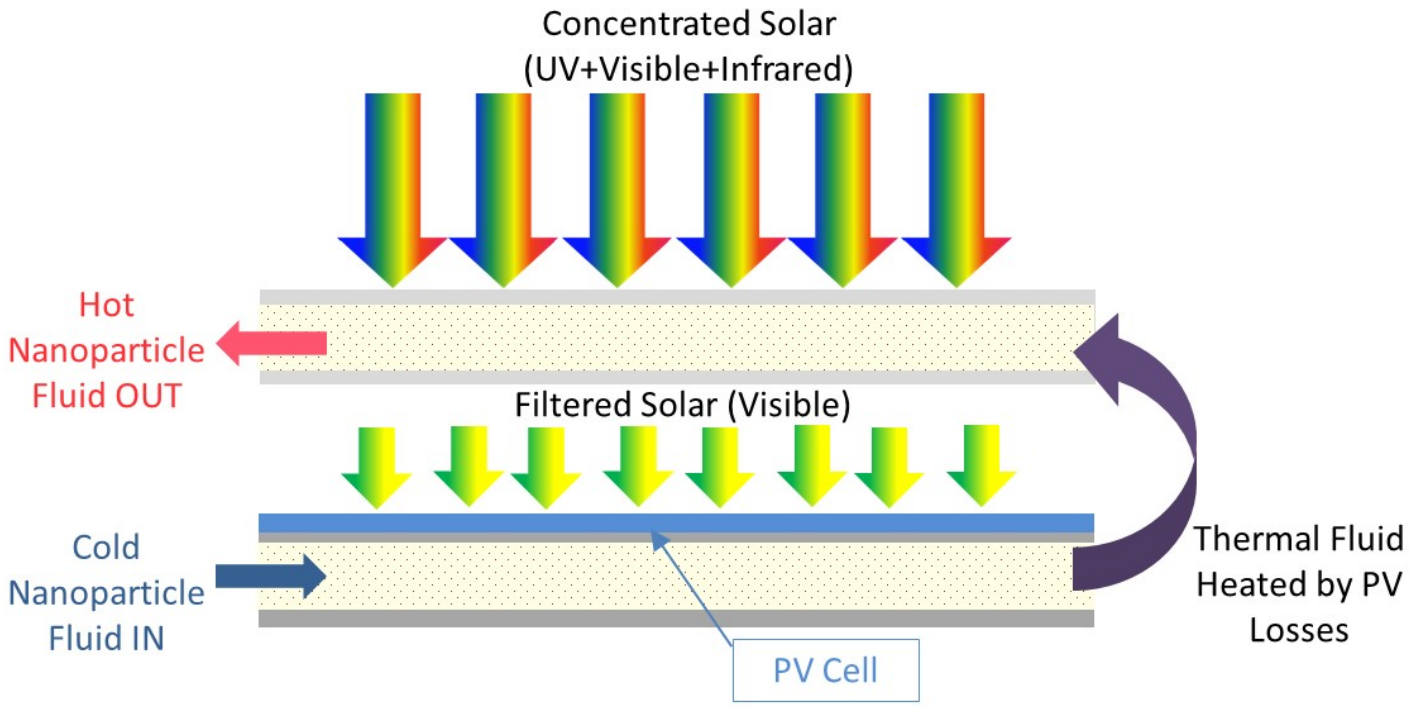
# Todd Otanicar, The University of Tulsa
# *Plasmonic Nanoparticle Enhanced Liquid Filters*

## ***What*** is the technology?

- *Working heat transfer fluid acts as spectral filter and selective absorber, prior to incident light hitting PV cell*
- *Incorporation of high-efficiency GaAs PV cell into receiver*



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**How** does it improve the state-of-the-art?

- *Low-cost method to achieve spectral filtering within the working fluid (high absorption in IR and high transmission in visible)*
- *Direct absorption of thermal energy into the working fluid.*
- *Thermally decouples PV system from thermal system while still capturing energy lost by non-ideal components*
- *Increased working temperature on PV side, including higher efficiency PV cell.*
- *Integrates well with existing architectures*

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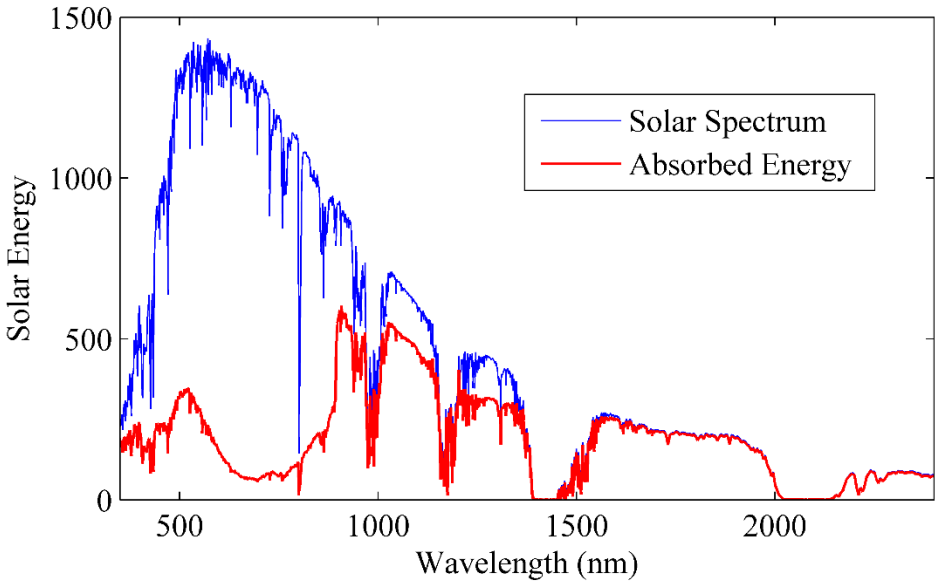
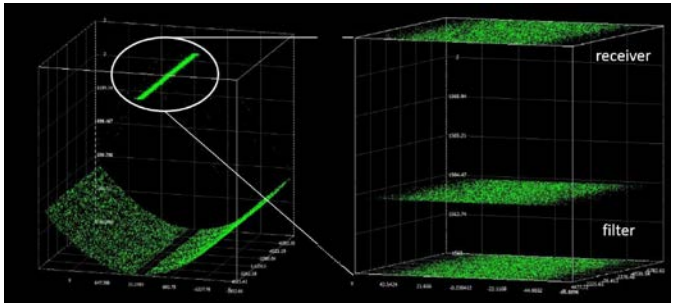
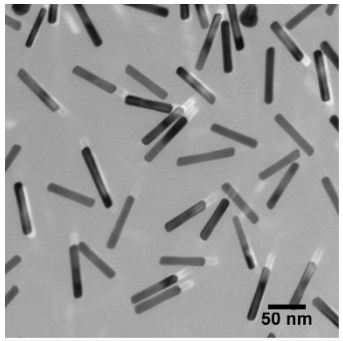
**Status and achievements** of the project to date

- *Desired spectral filtering achieved, including potential for development with other cells*
- *Synthesis of particles with desired (and controllable) optical properties achieved*
- *Thermal packaging and system design complete for 14x concentration configuration to meet exergy and dispatchability targets*
- *Optical design to work with current concentration and PV system architecture*




CHANGING WHAT'S POSSIBLE

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***Challenges*** that the team has encountered

- *Synthesis process for ITO nanocrystals results in non-stable particles in proposed working fluid*
- *High temperature stability, although pathway for development known*
- *"Low" E + high transmittance coatings for glass*