

# Microsphere-based Coatings for Radiative Cooling

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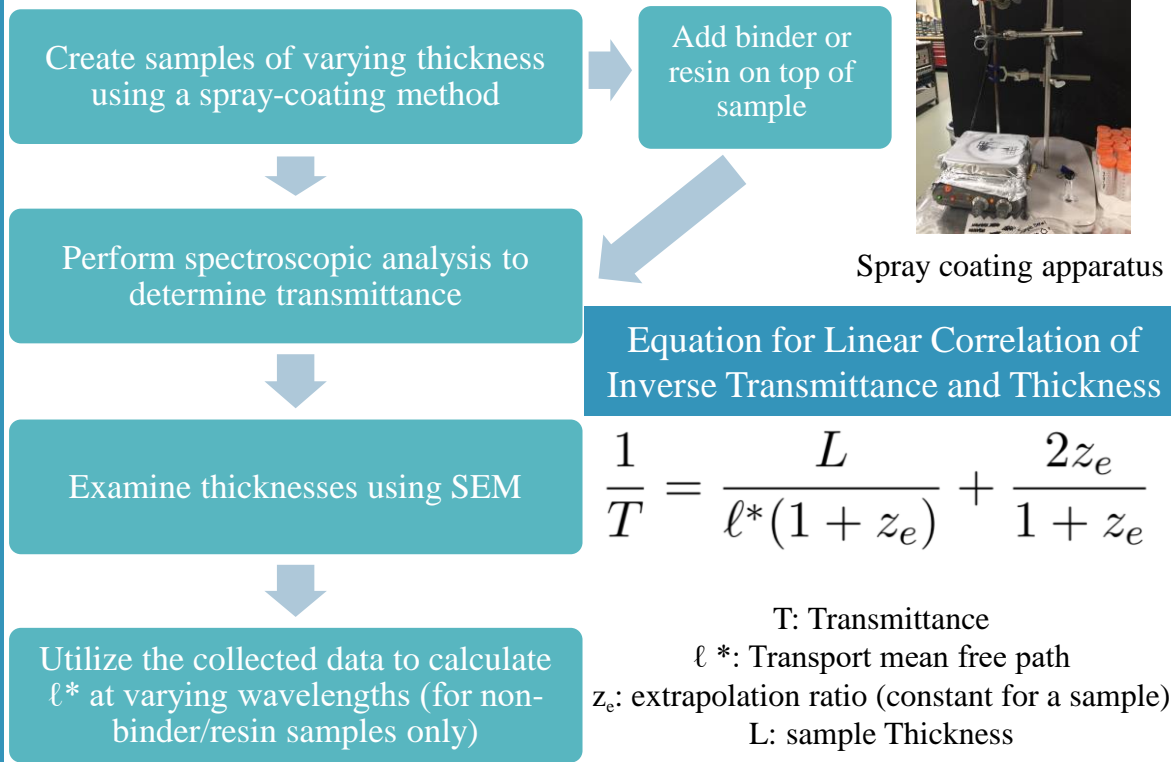
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**Problem** The lab previously developed a disordered solid silica microsphere coating that showed cooling potential. However, the coating was very mechanically weak as there was no material holding spheres in place

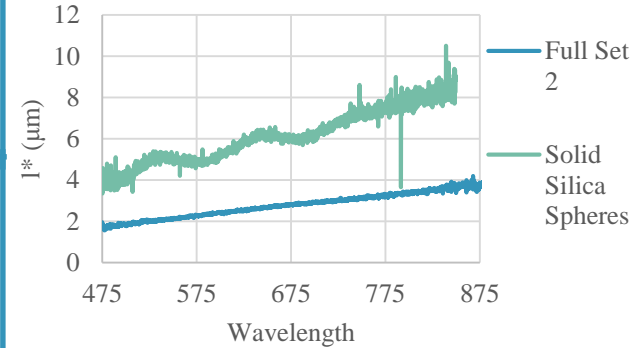
**Research Goal** Characterize properties of hollow polymer microspheres and develop a new coating using these microspheres and a binding agent to increase mechanical strength while maintaining cooling efficiency

## Methods

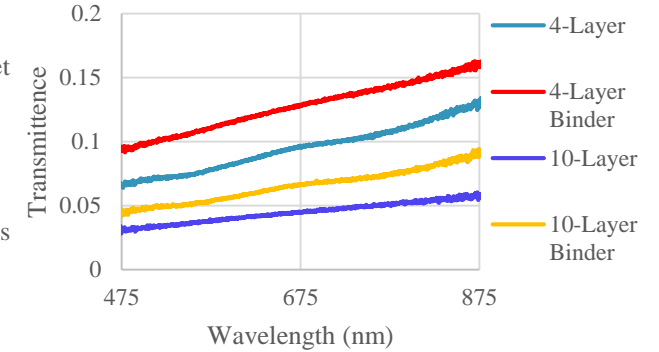


**Figures** Spheres Used: AF-1055 in IPA; Binder Used: LF-810 in cyclohexane

Graph 1: Wavelength vs.  $\ell^*$  Comparison



Graph 2: Wavelength vs. Transmittance Comparison



## Binder/Resin Results

Binders : LF-810; Silkopur 8081

Resins: Castin' Craft Clear Polyester Crafting Resin;  
 Acrylic Plastic Casting (24210-01)

- The resin activator solution caused sample degradation in both cases
- LF-810 was not strong enough to bind samples without greatly impacting transmittance due to solvent-induced sphere degradation (See Graph 2)
- Silkopur effectively bound the material but greatly reduced light scattering ability of the substrate

## Conclusions/Future Work

Due to low  $\ell^*$  values the hollow spheres are a promising candidate for future work. However, the binding and resin addition resulted in large transmittance changes. In the future alternate binding materials or application methods should be investigated in order to progress to a more mechanically stable coating