**Collaboration with Katie**

# **Background**

## Glass index of refraction

### Soda-lime glass is about 1.5

### Silicon dioxide is 1.46

### Titanium dioxide is 2.5 to 2.6

## Porous Silica by sol-gel method

### [This paper](https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9300687&casa_token=bzs1t-reeU4AAAAA:XZmpIvCAv79DH_lmlP-iZ7Fh3Lh35ICOVxhtvvuL7OId61tioxlYD_zWhuvEYKC-ZykvIIGMjw)

# **Theoretical Paper**

## Reflection vs wavelength vs incidence angle

### Just compare standard AR glass to thin film to glasswing nanocone AR

### For silicon

#### 280 nm to 1100 nm

### CdTe

#### 280 nm to 826.6 nm

## Four different locations; Pvsyst; open-source; create login and use software remotely

### Pittsburgh: 40.4 degrees North

### Penryn, UK: 50.1 degrees North

### Rockhampton, Australia: 23.4 South

### Chennai, India: 13.1 degrees North

#### Optimum tilt angle; documented (location specific; azimuth is not optimized)

### Additional Locations

#### Pick around 20 locations

#### Make plots

### Create a table with all the locations;

#### Latitude

#### Altitude

#### Due South or North

#### Glass

##### Optimum tilt; kW-h/m^2

##### 90 degrees

##### 0 degrees

#### Thin Film

##### Enhancement % (three angles)

#### GRIN

##### Enhancement % (three angles)

## Fixed Tilts

### Assume optimal tilt

### Tilt flat

### Vertical (for windows)

# **Experimental**

## Reflection

### Dependence

#### vs wavelength

#### vs incidence angle

### Structures

#### Glass

#### Glasswing

#### Etched glass

## Reflectance on various structures vs wavelength; vs incidence angle?

### Silicon

#### Bare

#### Glass cover

#### Glass cover with AR

#### Glasswing

#### Etch glass for you and send to you

##### At least 1 cm by 1 cm; smaller than 3 cm by 3 cm

##### 2 cm by 2 cm is best

##### > 6 samples

##### Use NFCF to measure transmission (and reflection)

##### Check Jung-Kun Lee’s lab or Paul Ohodnicki’s

### ~~CdTe~~

### GaAs

## Power conversion efficiency vs incidence angle

### Same materials

### As function of wavelength

## Use data for various geographical locations

### Different locations

### Using data from C (PCE vs incidence angle)

### Estimate over an entire year; difference in power generation

# Journals

## Nature Communication: 17.69

## Solar Energy: 7.188

## Optica: 10.64

## Materials Horizons: 15.72

# Similar work