Documentation for Calculating Optical Properties and Light Absorption Profile in Photocurable Composites

This package consists of the two codes:

1) mie_sphere.py – To compute scattering coefficient, absorption coefficient, and scattering anisotropy of the photocurable composite.
2) MC_light_absorption.py – To compute curing light absorption field within a cylindrical domain.

1) Computing optical properties:

```
Usage: mie_sphere.py [options]

Options:
  -h, --help        show this help message and exit
  -i INPUTFILE      The file containing spectral irradiance
(wavelengths in
                    nm).
  -n REL_INDEX      Relative refractive index of the sphere.
  -d DIAMETER       Diameter of the sphere (in micron).
  -v VOL_FRACTION   Volume fraction.
```

The code should be invoked as:

```
$ python mie_sphere.py -i LED_light.txt -n 1.05 -d 1 -v 0.1
```

It will produce the output as:

```
Absorption coefficient (/mm):  7.29462651863e-16
Scattering coefficient (/mm):  31.7386959461
Scattering anisotropy :  0.940010821307
```

2) Computing light absorption field:

Example <input_file>.txt file

```
# Sample geometry in cm
Sample height - 1.0
Sample radius - 0.125

# Sample boundaries
Refractive index (at Z=0) - 1.0
Refractive index (at Z=height) - 1.0
Refractive index (at X^2 + Y^2 = R^2) - 1.3

# Output filename
```

Output casename - Set10_1

Material properties
Scattering coefficient - 175
Chemical absorption coefficient - 0.4
Background absorption coefficient - 0.1
Scattering anisotropy - 0.9406
Refractive index - 1.5
No. of photons - 10000
Total number of steps - 1000
Weight threshold - 0.01
Roulette constant - 10
No. of segments - 10

Once, the input file has been organized. The code can be executed as,

python PhotonRunner.py -i <inputfile>.txt

The outputs of the calculation will be stored in a csv file with the input given for 'Output casename'.

Sample Outputs: