***Setup of simulation in MCPhotonics3D***

1. **Model preparation**
2. Make a model in SolidWorks
3. Set a new coordinate system
4. Save assembly in .STL format with a new coordinate system, uncheck parameter “move to positive coordinates”, save as ASCII. Control number of triangles, should not be too much (more than 15000), otherwise it takes too much time to calculate
5. Rename files of assembly as numbers starting from 1. Usually file #1 is a sample
6. **Setting optical properties**

Optical properties are described in functions “ElementAbsorbtionFactor”, “ElementRefractionCoefficient”, “ElementReflectionCoefficient”, “ElementSurfaceAbsorbtion”, “ElementQuantumYield”. In each functions there are subfunctions called smth. like “AF = Element1”, they describe properties for each elements (by the number). These properties can be constants or functions of wavelength (Vector.WaveLength). In all functions element #0 is air, no need to change its properties.

1. Set element absorbtion coefficient
2. Set element reflection coefficient (it can be constant, or Fresnel’s (use function “AverageFrenelReflectionCoefficient” or other)
3. Set element refraction coefficient
4. Set element surface absorbtion coefficient (basically it is needed for PVs)
5. **Set parameters for initial beam (initial photons generation)**

Photons are generated with a function “GenerateRandomPhotonInBeamSpot” and others. Input parameters are wavelength, central point of the spot, diameter of the spot, spot angle, body number where photons are generated (0, of in air). It is important to change variable called “DirectionNotNorm” in this function to correct! It defines the direction of the beam. All other parameters for “GenerateRandomPhotonInBeamSpot “ are usually set from the main script or function.

1. **Define the PL**

The photon, re-emitted in PL is generated in the function called “PL”. It generates a new random direction of the photon, uniformly distributed over the sphere. Also it generates the new wavelength, in simple case it can be just different from the initial wavelength, in general it needs a real emission spectrum (integrated from 0 to wavelength – probability function of wavelengths).

1. **Make a basic script**

It should load the geometry (“LoadCavityGeometry” with parameters “DirectoryName” and number of geometry files).

Usually the center point for photon beam, its diameter and angle must be set in main script. The initial wavelength can be also set in main script, if simple function fro photon generation is used.

The main script should contain basic cycle:

* New photon generation
* Photon propagation (PhotonPropagation)

Also it can show graphical results (“GeometryPlot” and “PhotonPathPlot”).

Description of photon variable (Vector):

* + CurrentPoint (shows the begining point of photon’s move at the current step)
  + DirectoryVector (direction of the current step)
  + CurrentBody (where the photon now)
  + CurrentElement (the surface element of the body, on which the CurrentPoint is. If equal to 0, the photon is inside the body, not on the surface)
  + PreviousBody
  + PreviousElement
  + Wavelength