

ABSTRACT

In this work, we present the data for the demonstration of interstitial spectroscopy with bioresorbable fibers at null distance, using time-domain diffuse optics that disentangles absorption from scattering properties and probes the tissues up to a depth of a few cm around the fiber tips. We exploit a fast-gated single-photon avalanche diode with 55 dB of dynamic range to overcome the burst of ‘early’ photons hiding the information of absorption from deep tissues. We tested the absorption linearity—retrieving the water spectrum in the 700–950 nm range with 85% accuracy over two decades of absorption change—and verified the hypothesis of a scattering-independent absorption retrieval. Further, we were able to detect spectral changes at a distance of 1 cm from an inclusion embedded in a biological tissue.

Article: Bioresorbable fibers for interstitial null-separation diffuse optical spectroscopy using fast temporal gating (DOI: 10.1088/2515-7647/ada656)

[Vamshi Damagatla et al 2025 J. Phys. Photonics 7 015011](#)

DATASET OVERVIEW

In this dataset, we provide information regarding the raw data, preprocessed data, metadata and the tools to read it, the acquisition methods, and analysis techniques, so as to provide a means for others to replicate our results or use them for other purposes. Briefly, the data set is divided into 4 folders to be read in that order for better understanding.

1) **1_Overview:**

- a) **Journal_article.pdf** – open access article published in IOP: Journal of Physics-Photonics with a CC BY 4.0 license
- b) **Index.JSON** – JSON file containing information about the files of the other folders, acting as an index for the dataset (all JSON files can be opened by notepad or any TXT reader)
- c) **READ ME.pdf** – (currently opened file)

2) **2_Data:**

- a) **Raw_data:** The raw data acquired, directly as part of measurements

a.1) Data_Gated DTOFs: Contains the obtained DTOFs

- **INBs00xx.DAT** – Raw data in binary encoded format, containing the acquired curves of the Instrumental response function (IRF) to be read for analysis, that can be read using the *Read.DTOFs_python.py/.m* codes in Tools section
- **INBm00xx.DAT** – Raw data in binary encoded format, containing the acquired curves of the measurements on samples to be read for analysis, that can be read using the *Read.DTOFs_python.py/.m* codes in Tools section

a.2) Data_Attenuator_POS: Contains the calibration files

- **INBs00xx.xlsx** – Calibration files of the attenuation to be used with the *Reconstruct_IRF.DTOFs.py* code in the tools to obtain the reconstructed IRF DTOFs from the raw data
- **INBm00xx.xlsx:** Calibration files of the attenuation to be used with the *Reconstruct_Data.DTOFs.py* code in the tools to obtain the reconstructed measurement DTOFs from the raw data

- b) **Preprocessed_data:**

- **TGs00xx.DAT** – Reconstructed IRF DTOFs in binary encoded format obtained using *Reconstruct_IRF.DTOFs.py*. Can be read for analysis using the *Read.DTOFs.python.py/.m* codes in Tools section
- **TGm00xx.DAT** – Reconstructed measurement DTOFs in binary encoded format obtained using *Reconstruct_Data.DTOFs.py*. Can be read for analysis using the *Read.DTOFs.python.py/.m* codes in Tools section

c) **Meta_data**: Contains experimental metadata

- **Info.JSON** – JSON file containing information on the experimental setup, the samples, data acquisition, data formats, etc.
- **Table.xlsx**: Digital “Labbook” of the experimental data files cross-referenced with the samples and the acquisition/ analysis parameters

3) **3_Tools**:

- Read.DTOFs.matlab.m** – MATLAB script to read DTOFs from a .DAT file into a MATLAB matrix and visualize the DTOFs
- Read.DTOFs.python.py** – PYTHON script to read DTOFs from a .DAT file into a PYTHON numpy array and visualize the DTOFs
- Reconstruct_IRF.DTOFs.py** – PYTHON script to combine gated DTOFs raw data using calibration files to obtain Reconstructed DTOFs for the IRF
- Reconstruct_Data.DTOFs.py** – PYTHON script to combine gated DTOFs raw data using calibration files to obtain Reconstructed DTOFs for the measurements
- Testfile.DAT** – Testfile to check the functioning of the codes to read the .DAT files

4) **4_Analysis**: Excel files with the data of the results published in the article, shown with the appropriate pivot table filtering

- 1a_Refractive_index.xlsx**: Refractive index characterization of the core and cladding glasses of the CPG fibers as shown in Figure 1a.
- 3a_Linearity.xlsx**: Absorption linearity results in Water+Intralipid phantoms as shown in Figure 3a.
- 3b_Scattering_independance.xlsx**: Confirmation of Scattering-independent-absorption-retrieval (SIAR) analysis on Water+Intralipid phantoms as shown in Figure 3b.
- 4_Water_speck_inclusion.xlsx**: Spectral presence of an absorbing inclusion as shown in Figure 4.
- 5_Strutto_speck_inclusion.xlsx**: Spectral presence of an absorbing inclusion as shown in Figure 5.
- 6_Components_percentage.xlsx**: Contribution of inclusion and background components in the measurements as shown in Figure 6.
- Fiber_test_water_spectra.xlsx**: Testing of the fibers to retrieve the water spectrum at $\rho = 1\text{cm}$