doric

Low Autofluorescence Patch Cords

Application Note

Version 1.0.0

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1

Low Autofluorescence Patch Cords

1.1 Overview

All optical fibers posses an innate fluorescence due to their chemical composition. Often called **Autofluorescence**, this light can interfere with photometry measurements by overwhelming them. The following document details the usage and specifications of the Doric Lenses *Low Autofluorescence (LAF) Patch Cords*. This includes a procedure to drastically reduce autofluorescence through photobleaching.

1.2 Patch Cord Photobleaching

Photobleaching an optical fiber involves exposing the fiber to a high light intensity to deactivate (or "bleach") the fluorophores within the fiber that induce autofluorescence. This process allows the autofluorescence to be minimized, as shown in Fig. 1.1.

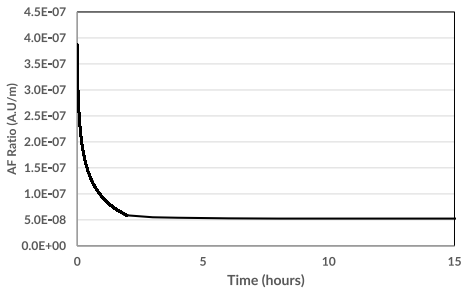
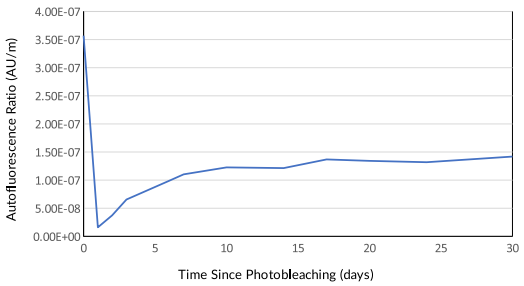


Figure 1.1: *Photobleach Response Curve (Typical)*

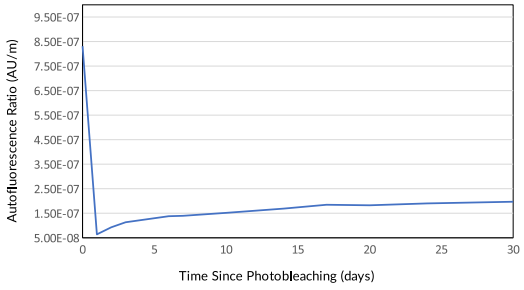
Photobleaching must be done before any photometry experiments where autofluorescence can overwhelm the returning signal. This procedure should be used with all elements of the system where autofluorescence can be generated.

- **THIS PROCESS MUST BE DONE WHILE THE SYSTEM IS DISCONNECTED FROM ALL EXPERIMENTAL SUBJECTS**.
- The items to be bleached include most elements connected to the **Sample** port of an *FMC* or *ilFMC*, such as patch cords and rotary joints. The following example

  The **Light Recovery System** represents all elements connected to the **Sample Port** of a *Fluorescence Mini-cube*. These can include patch-cords and rotary joints. The following example shows photobleaching of a single patch cord
- When multiple elements are used, they can be placed in series, as they would be during an experiment, to photobleach them all at once.
- When using a multi-channel system, such as one using an *AHRJ_2x2_PT* or a *Dual Fiber-optic Patch Cord*, each channel must be bleached separately.

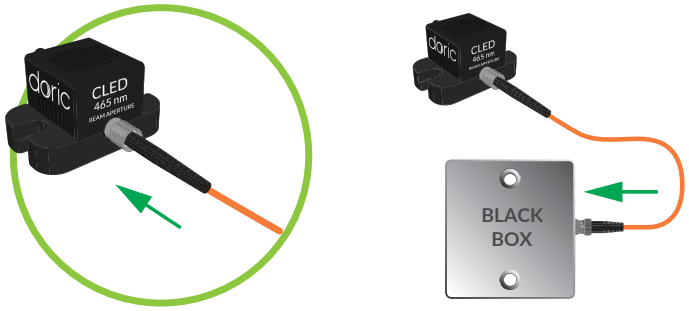


(a) *200 µm, 0.57 NA Optical Fiber*



(b) *400 µm, 0.57 NA Optical Fiber*

Figure 1.2: *Typical Autofluorescence Recovery Over Time After Photobleaching*



(a) (b)

Figure 1.3: *Photobleach Procedure*

1. Connect one end of the *Patch Cord* to the optical fiber output of a blue LED light source, typically the one used for the experiment (Fig. 1.3a).
2. Place the opposite end of the **Patch Cord** in a beam dump or black box (Fig. 1.3b).
    - Large quantities of blue LED or laser light can be harmful.
    - The disconnected end of the **Patch Cord** will emit intense light during the photobleaching process; it is important that it be isolated to avoid harm.

(c) (d) (e)

Figure 1.3: *Photobleach Procedure (Continued)*

3. Set the output current of the light source at its maximum value (Fig. 1.3c).
4. Leave the light on for 1 to 2 hours. An illumination for 1-2 hours should decrease the autofluorescence by 75 % (typical) of its initial value (Fig. 1.3d).
5. Further photobleaching (12+ hours) can reduce the natural autofluorescence by 90% (typical) of its initial value (Fig. 1.3e).
6. Repeat the process for each channel of the **Patch Cord** should there be multiple channels.
7. Photobleaching provides a temporary reduction of autofluorescence. Repeat this procedure before each experiment to ensure a minimal level of autofluorescence.
    - Fig. 1.2 shows the autofluorescence recovery of our 200 µm (Fig 1.2a) and 400 µm (Fig 1.2b) diameter core fiber. Day 0 represents the patch cord fiber before photobleaching.
    - As autofluorescence recovery is very slow (Fig. 1.2), a simple 1 hour touch-up can be sufficient if the patch cord was used in the last few days.

2

Support

2.1 Maintenance

The product does not require any maintenance. Do not open the enclosure. Contact Doric Lenses for return instructions if the unit doesn't work properly and needs to be repaired.

2.2 Warranty

This product is under warranty for a period of 12 months. Contact Doric Lenses for return instructions. This warranty will not be applicable if the unit is damaged or needs to be repaired as a result of improper use or operation outside the conditions stated in this manual.

2.3 Contact us

For any questions or comments, do not hesitate to contact us by:

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