Spectra_markdown

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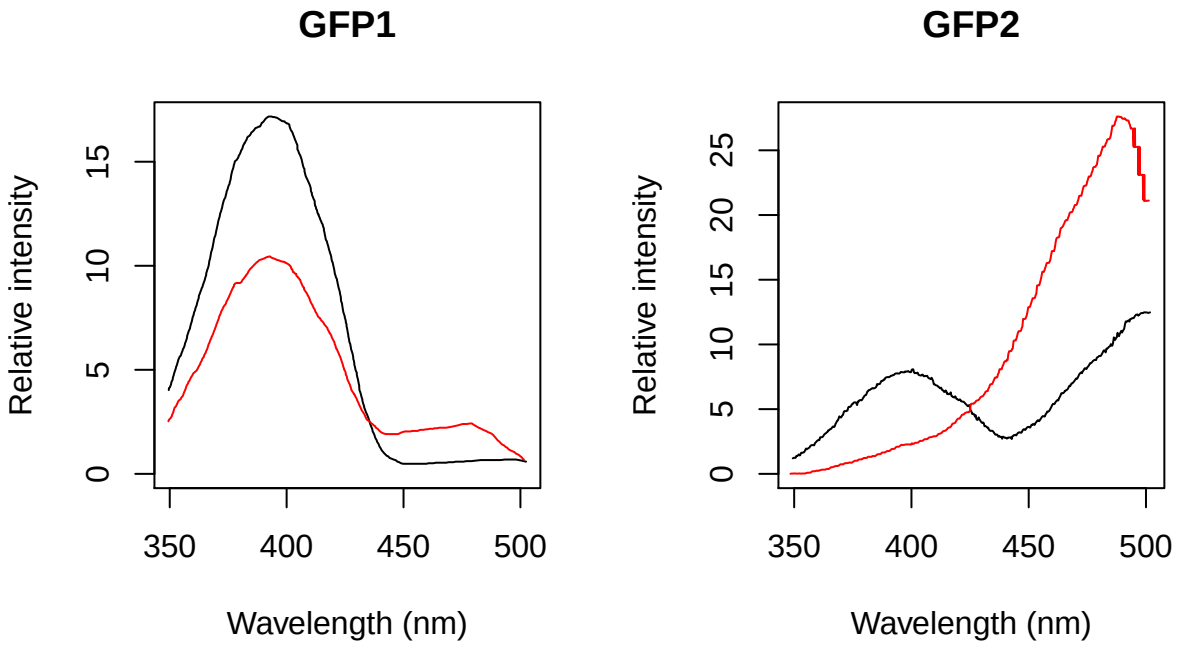
```
source("Spectra_source.R")
```

```
# Import data
gfp1_dat <- read.csv("rogfp1.csv", header = FALSE, stringsAsFactors = FALSE,
                     fileEncoding="UTF-8-BOM")
gfp2_dat <- read.csv("rogfp2.csv", header = FALSE, stringsAsFactors=FALSE,
                      fileEncoding="UTF-8-BOM")
```

```
# Create GFP1
GFP1 <- SpectraPoint(gfp1_dat$V1, gfp1_dat$V2, gfp1_dat$V3, gfp1_dat$V4)

# Create GFP 2
GFP2 <- SpectraPoint(gfp2_dat$V1, gfp2_dat$V2, gfp2_dat$V3, gfp2_dat$V4)
```

```
# Plot GFP 1 and 2
par(mfrow = c(1, 2), pty = 's')
plotOxRed(GFP1, main = "GFP1")
plotOxRed(GFP2, main = "GFP2")
```

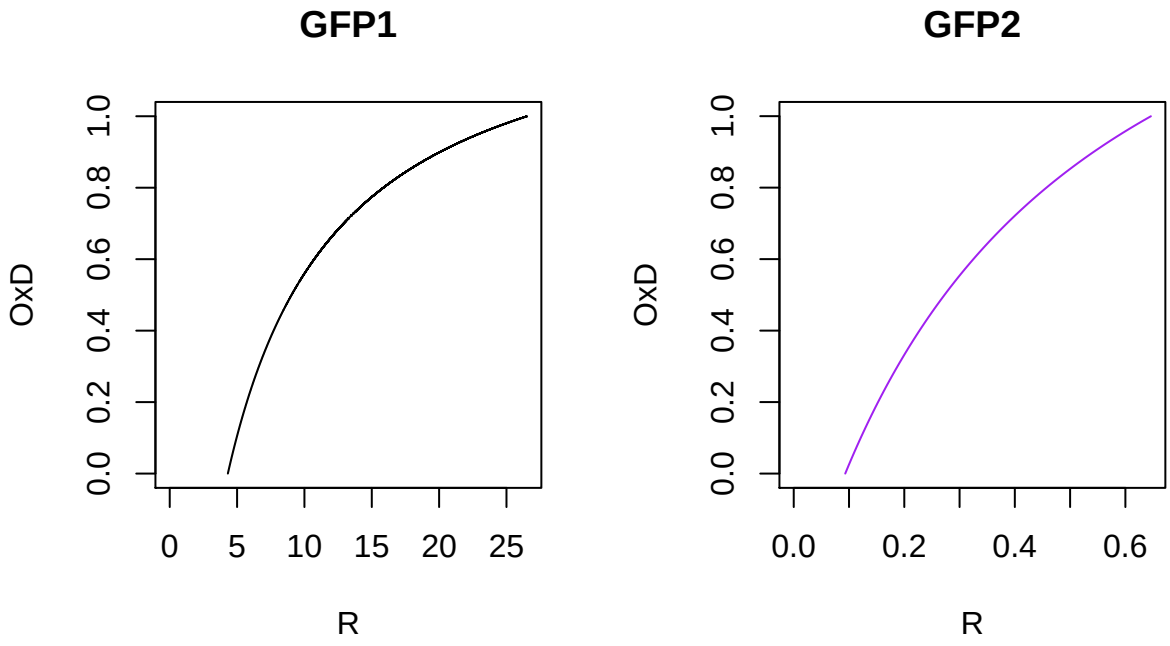


```r
# Plot OxD vs R
par(pty = 's', mfrow = c(1,2))

# GFP1
plotROxD(GFP1, 395, 405, 475, 485, main = "GFP1")
```

```
## [1] "Status updates:"
## [1] "The mean intensity at: 395 - 405 is: 16.49 when oxidized"
## [1] "The mean intensity at: 475 - 485 is: 0.62 when oxidized"
## [1] "The mean intensity at: 395 - 405 is: 9.91 when reduced"
## [1] "The mean intensity at: 475 - 485 is: 2.3 when reduced"
## [1] "Rmax is: 26.53"
## [1] "Rmin is: 4.31"
## [1] "Delta is: 0.27"
```

```r
# GFP2
plotROxD(GFP2, 395, 405, 490, 500, main = "GFP2", col = "purple")
```

```
## [1] "Status updates:"
## [1] "The mean intensity at: 395 - 405 is: 7.83 when oxidized"
## [1] "The mean intensity at: 490 - 500 is: 12.11 when oxidized"
## [1] "The mean intensity at: 395 - 405 is: 2.35 when reduced"
## [1] "The mean intensity at: 490 - 500 is: 25.18 when reduced"
## [1] "Rmax is: 0.65"
## [1] "Rmin is: 0.09"
## [1] "Delta is: 0.48"
```



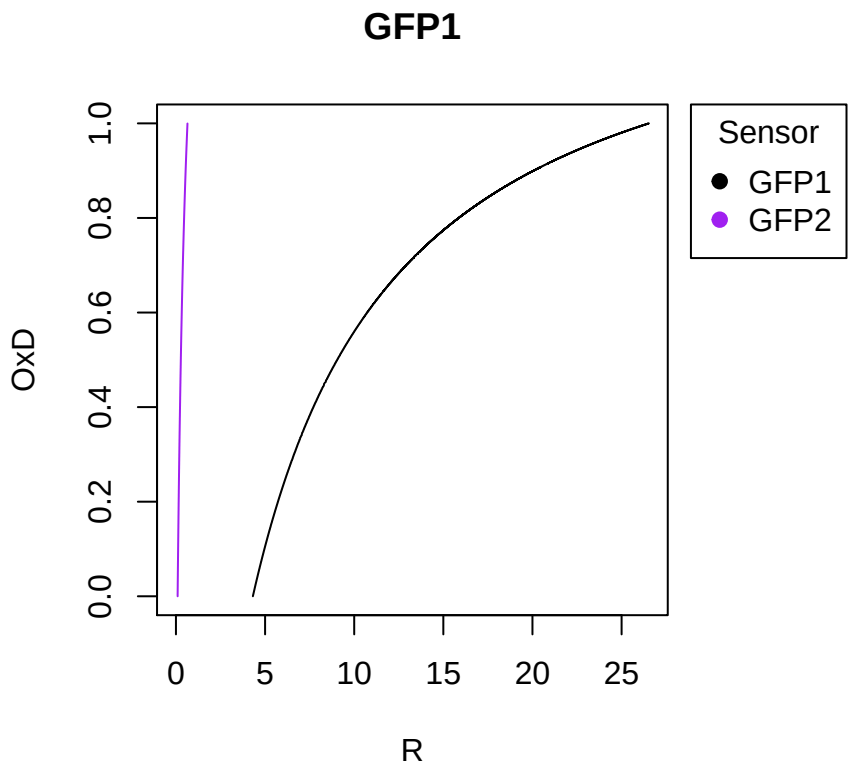
```r
# Together
par(mfrow = c(1,1), pty = 's')
plotROxD(GFP1, 395, 405, 475, 485, main = "GFP1")
```

```
## [1] "Status updates:"
## [1] "The mean intensity at: 395 - 405 is: 16.49 when oxidized"
## [1] "The mean intensity at: 475 - 485 is: 0.62 when oxidized"
## [1] "The mean intensity at: 395 - 405 is: 9.91 when reduced"
## [1] "The mean intensity at: 475 - 485 is: 2.3 when reduced"
## [1] "Rmax is: 26.53"
## [1] "Rmin is: 4.31"
## [1] "Delta is: 0.27"
```

```r
plotROxD(GFP2, 395, 405, 490, 500, main = "GFP2", col = "purple", points = TRUE);
```

```
## [1] "Status updates:"
## [1] "The mean intensity at: 395 - 405 is: 7.83 when oxidized"
## [1] "The mean intensity at: 490 - 500 is: 12.11 when oxidized"
## [1] "The mean intensity at: 395 - 405 is: 2.35 when reduced"
## [1] "The mean intensity at: 490 - 500 is: 25.18 when reduced"
## [1] "Rmax is: 0.65"
## [1] "Rmin is: 0.09"
## [1] "Delta is: 0.48"
```

```r
legend("topright", title = "Sensor", inset=c(-0.35,0), xpd=TRUE, c("GFP1", "GFP2"), pch = c(19,19), col
```



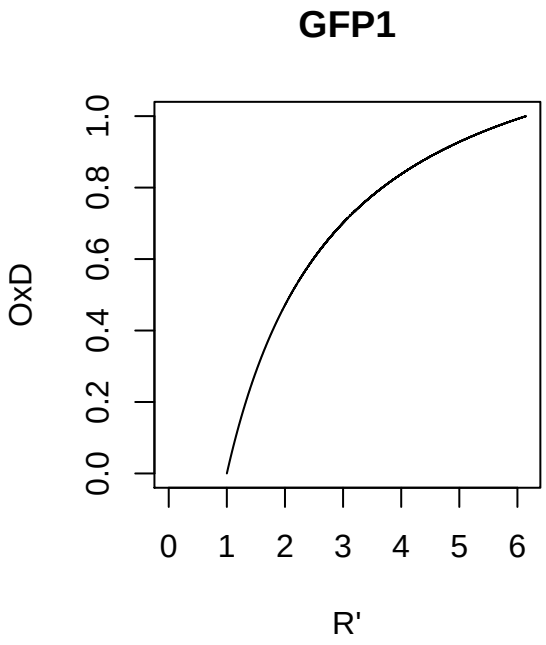
```r
# Theoretical Sensor with Rmax = 6, delta = 0.2
#plotROxD(SpectraValues(Rmax = 6, Rmin = 1, delta = 0.2, lambda_1 = 410, lambda_2 = 470), 410, 410, 470

# Theoretical Sensor with Rmax = 6, delta = 1
#plotROxD(SpectraValues(Rmax = 6, Rmin = 1, delta = 1, lambda_1 = 410, lambda_2 = 470), 410, 410, 470,
```

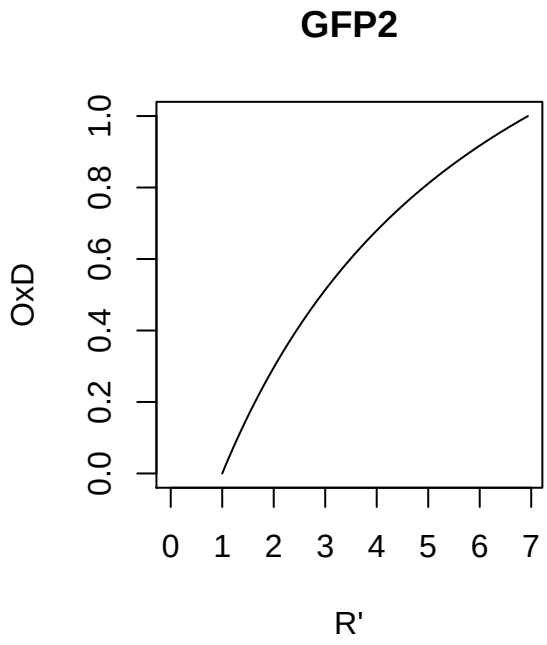
```r
# Plot OxD vs R'
par(mfrow = c(1, 2), pty = 's')

# GFP1
plotRPrimeOxD(GFP1, 395, 405, 475, 485, main = "GFP1")
```

```
## [1] "Status updates:"
## [1] "The mean intensity at: 395 - 405 is: 16.49 when oxidized"
## [1] "The mean intensity at: 475 - 485 is: 0.62 when oxidized"
## [1] "The mean intensity at: 395 - 405 is: 9.91 when reduced"
## [1] "The mean intensity at: 475 - 485 is: 2.3 when reduced"
## [1] "Rmax is: 26.53"
## [1] "Rmin is: 4.31"
## [1] "Delta is: 0.27"
```

```r
# GFP2
plotRPrimeOxD(GFP2, 395, 405, 490, 500, main = "GFP2")
```

```
## [1] "Status updates:"
## [1] "The mean intensity at: 395 - 405 is: 7.83 when oxidized"
## [1] "The mean intensity at: 490 - 500 is: 12.11 when oxidized"
## [1] "The mean intensity at: 395 - 405 is: 2.35 when reduced"
## [1] "The mean intensity at: 490 - 500 is: 25.18 when reduced"
## [1] "Rmax is: 0.65"
## [1] "Rmin is: 0.09"
## [1] "Delta is: 0.48"
```



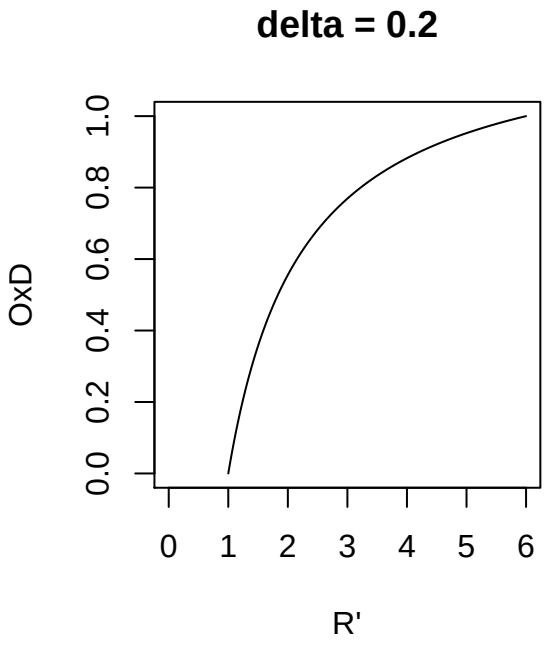


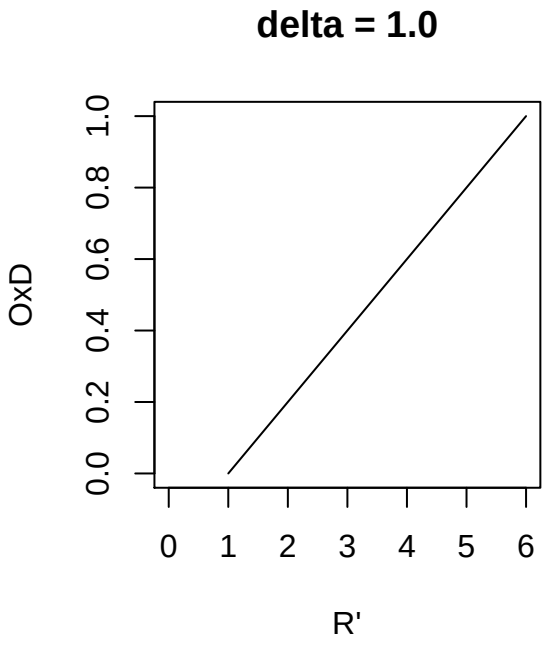

```
# Theoretical Sensor with Rmax = 6, delta = 0.2
plotRPrimeOxD(SpectraValues(Rmax = 6, Rmin = 1, delta = 0.2, lambda_1 = 410, lambda_2 = 470), 410, 410,
```

```
## [1] "Status updates:"
## [1] "The mean intensity at: 410 - 410 is: 1.2 when oxidized"
## [1] "The mean intensity at: 470 - 470 is: 0.2 when oxidized"
## [1] "The mean intensity at: 410 - 410 is: 1 when reduced"
## [1] "The mean intensity at: 470 - 470 is: 1 when reduced"
## [1] "Rmax is: 6"
## [1] "Rmin is: 1"
## [1] "Delta is: 0.2"
```

```
# Theoretical Sensor with Rmax = 6, delta = 1
plotRPrimeOxD(SpectraValues(Rmax = 6, Rmin = 1, delta = 1, lambda_1 = 410, lambda_2 = 470), 410, 410, 4
```

```
## [1] "Status updates:"
## [1] "The mean intensity at: 410 - 410 is: 6 when oxidized"
## [1] "The mean intensity at: 470 - 470 is: 1 when oxidized"
## [1] "The mean intensity at: 410 - 410 is: 1 when reduced"
## [1] "The mean intensity at: 470 - 470 is: 1 when reduced"
## [1] "Rmax is: 6"
## [1] "Rmin is: 1"
## [1] "Delta is: 1"
```





From the spectra, perhaps we can find the error in E caused from the uncertainty from the filter band.