Fermi National Accelerator Laboratory

FERMILAB-TM-1873

Final Results from the SDC Dopant Search for New Green Wavelength Shifting (WLS) Fibers VOLUME II

A. Pla-Dalmau, G.W. Foster and G. Zhang

Fermi National Accelerator Laboratory
P.O. Box 500, Batavia, Illinois 60510

December 1993

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VOLUME II

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December 13, 1993

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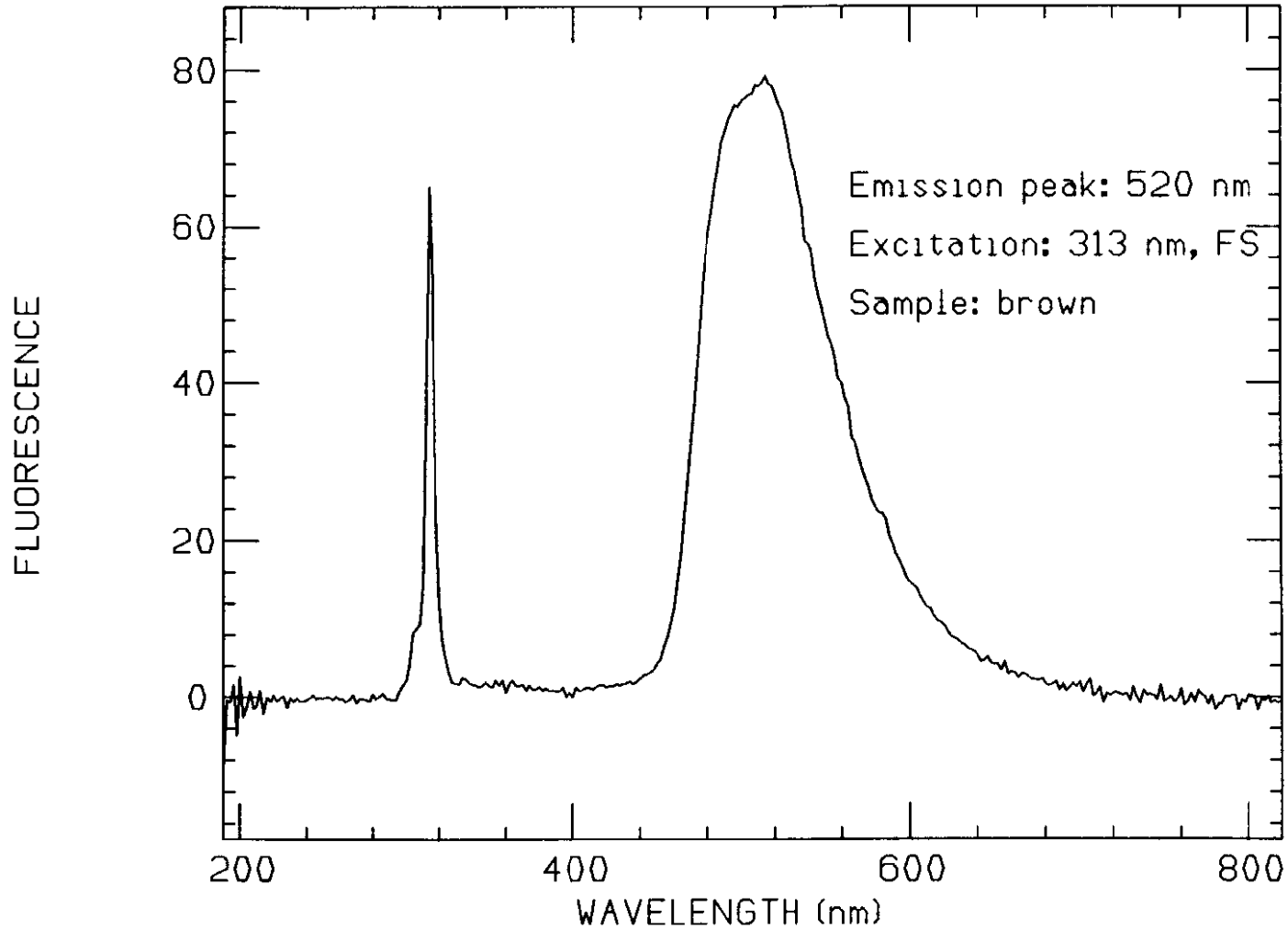
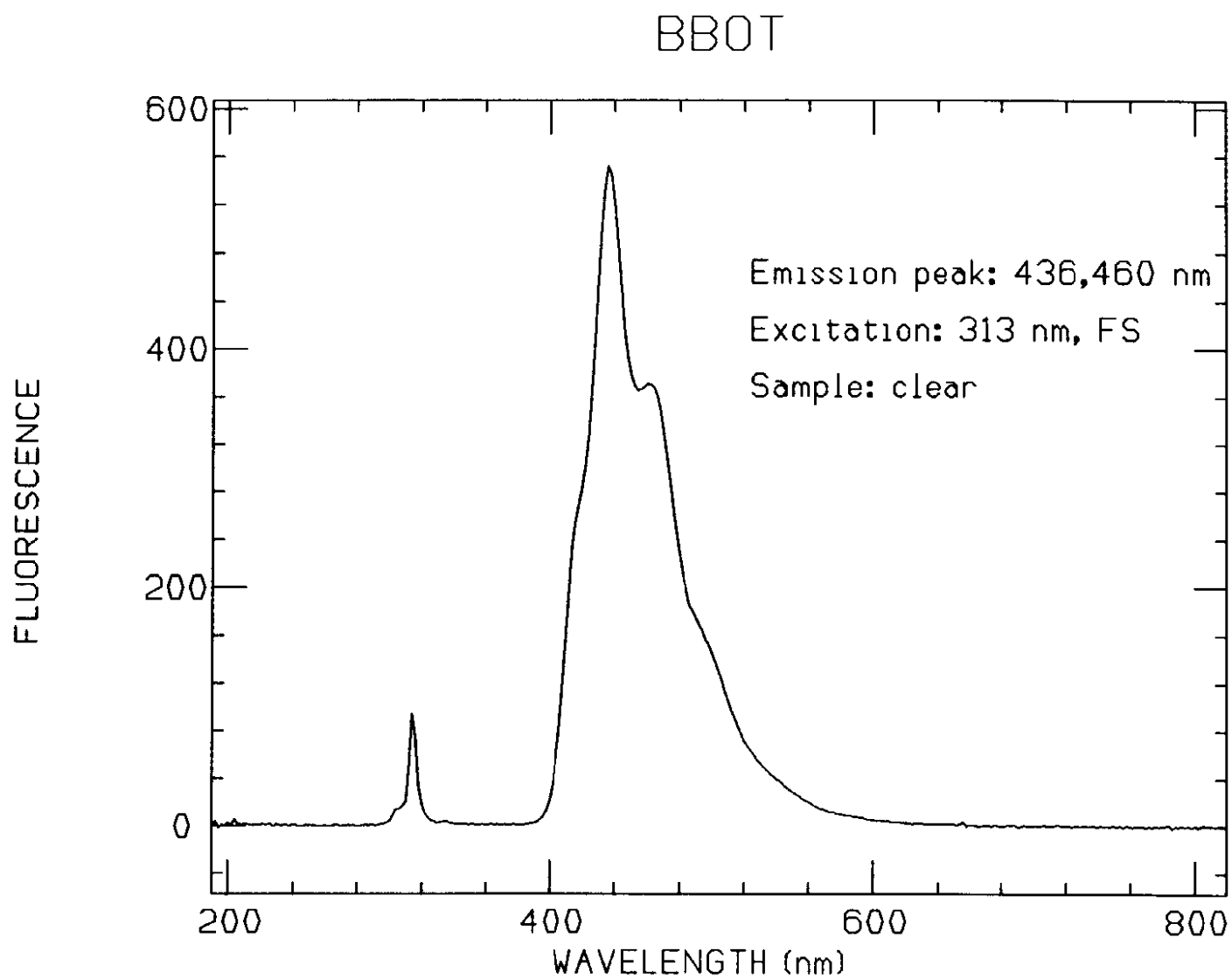
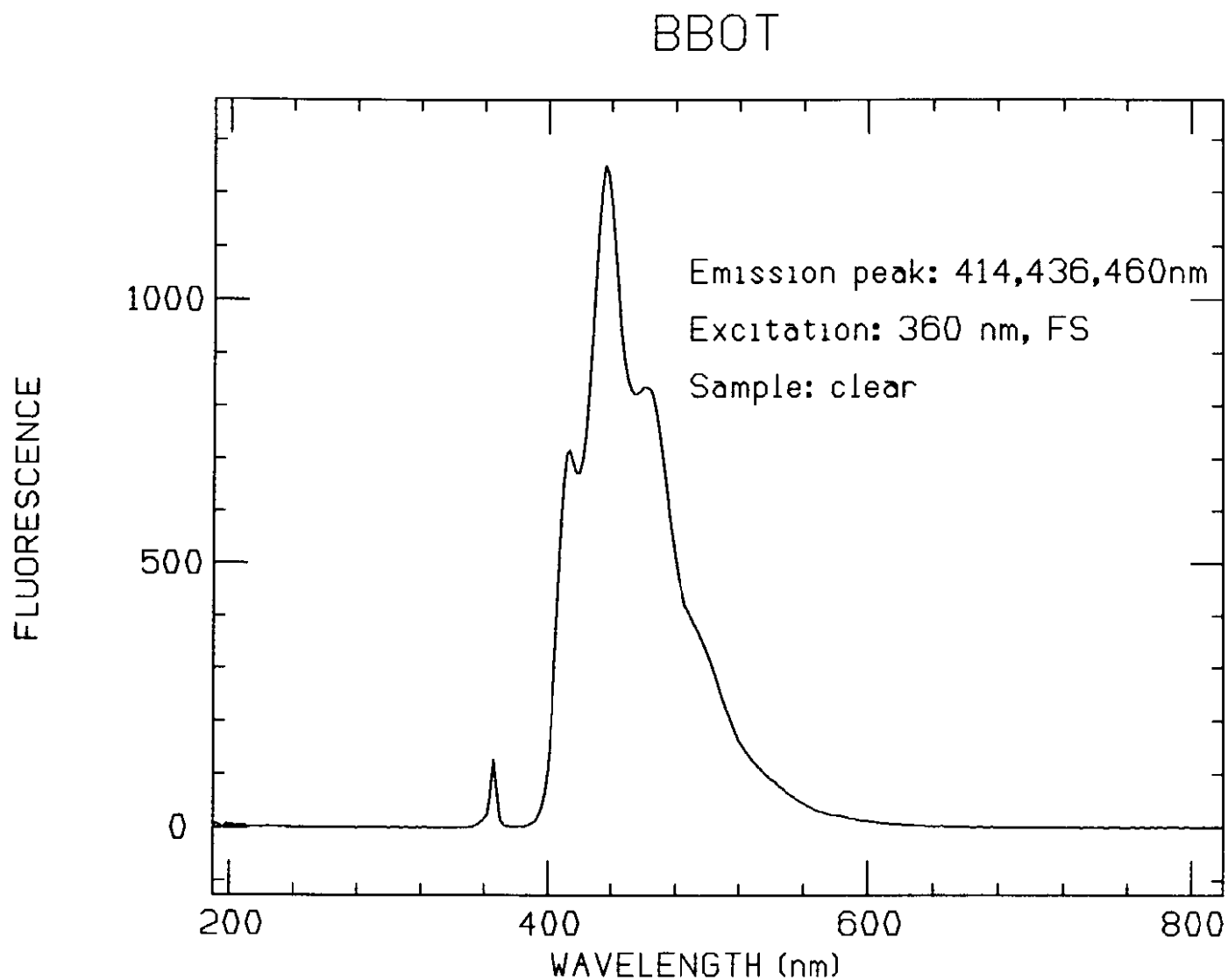
ACRIDINE ORANGE BASE




BBOT
Emission peak: 436,460 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
600
400
200
0
200
400
600
800
WAVELENGTH (nm)


BBOT
Emission peak: 414,436,460nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1000
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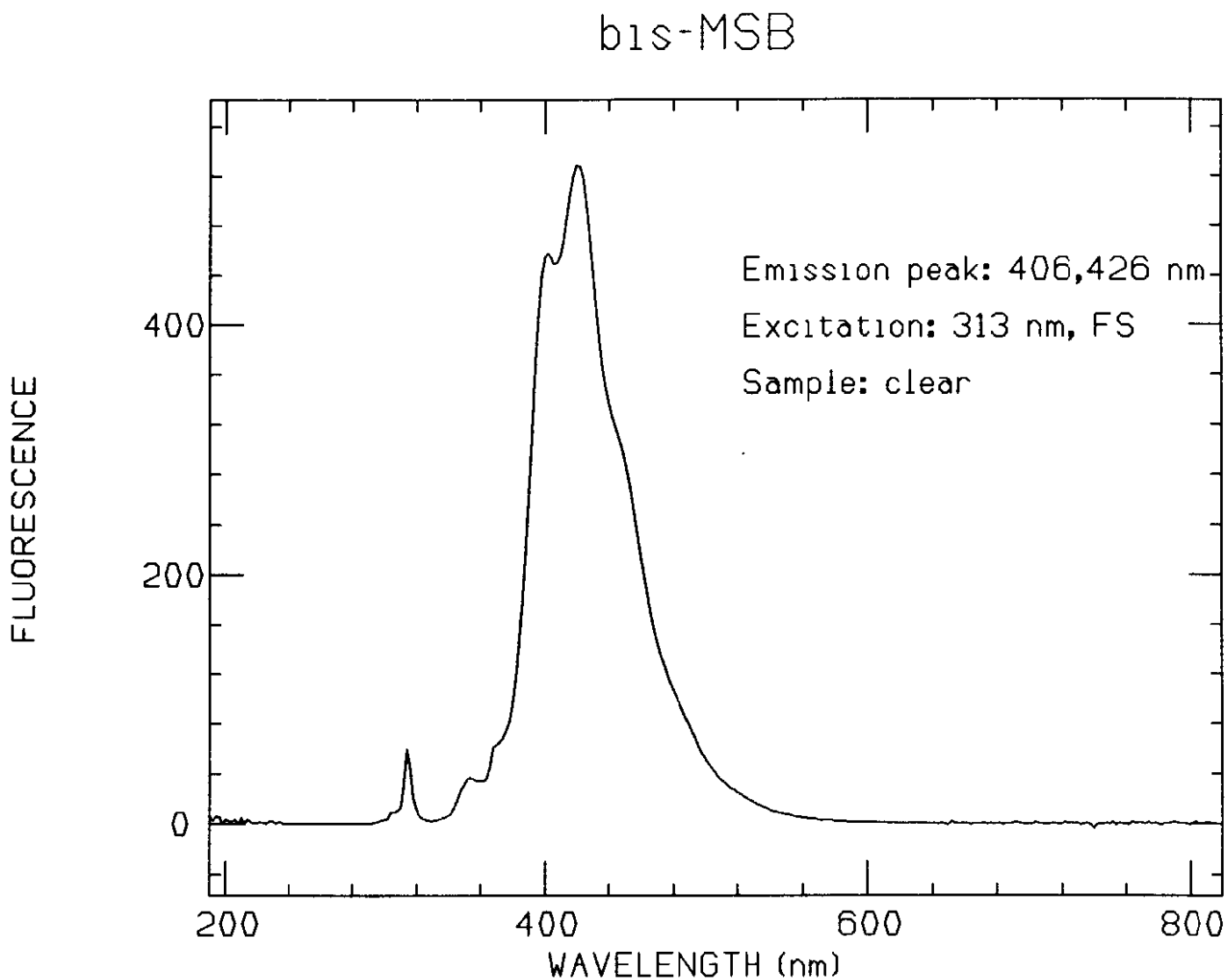
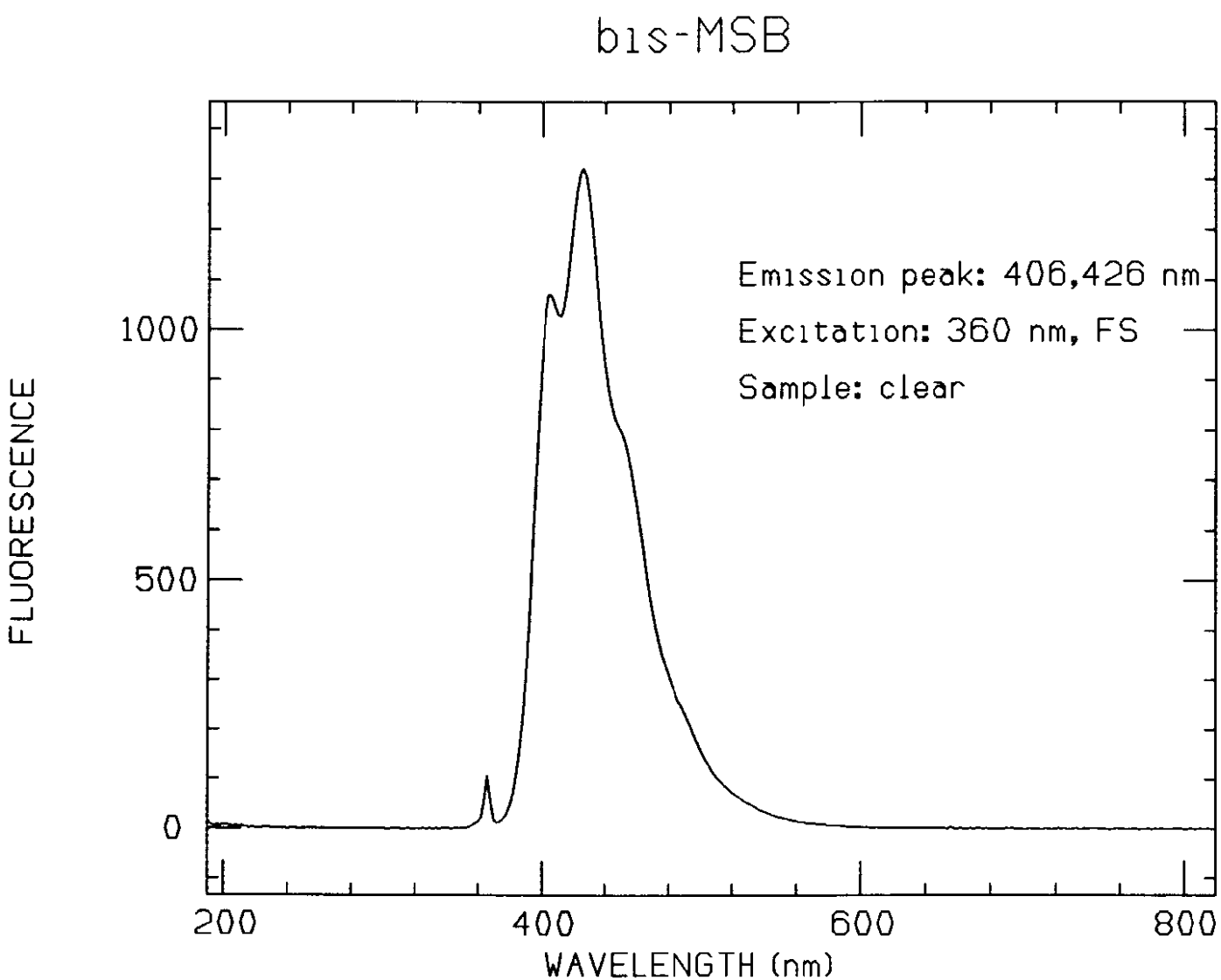
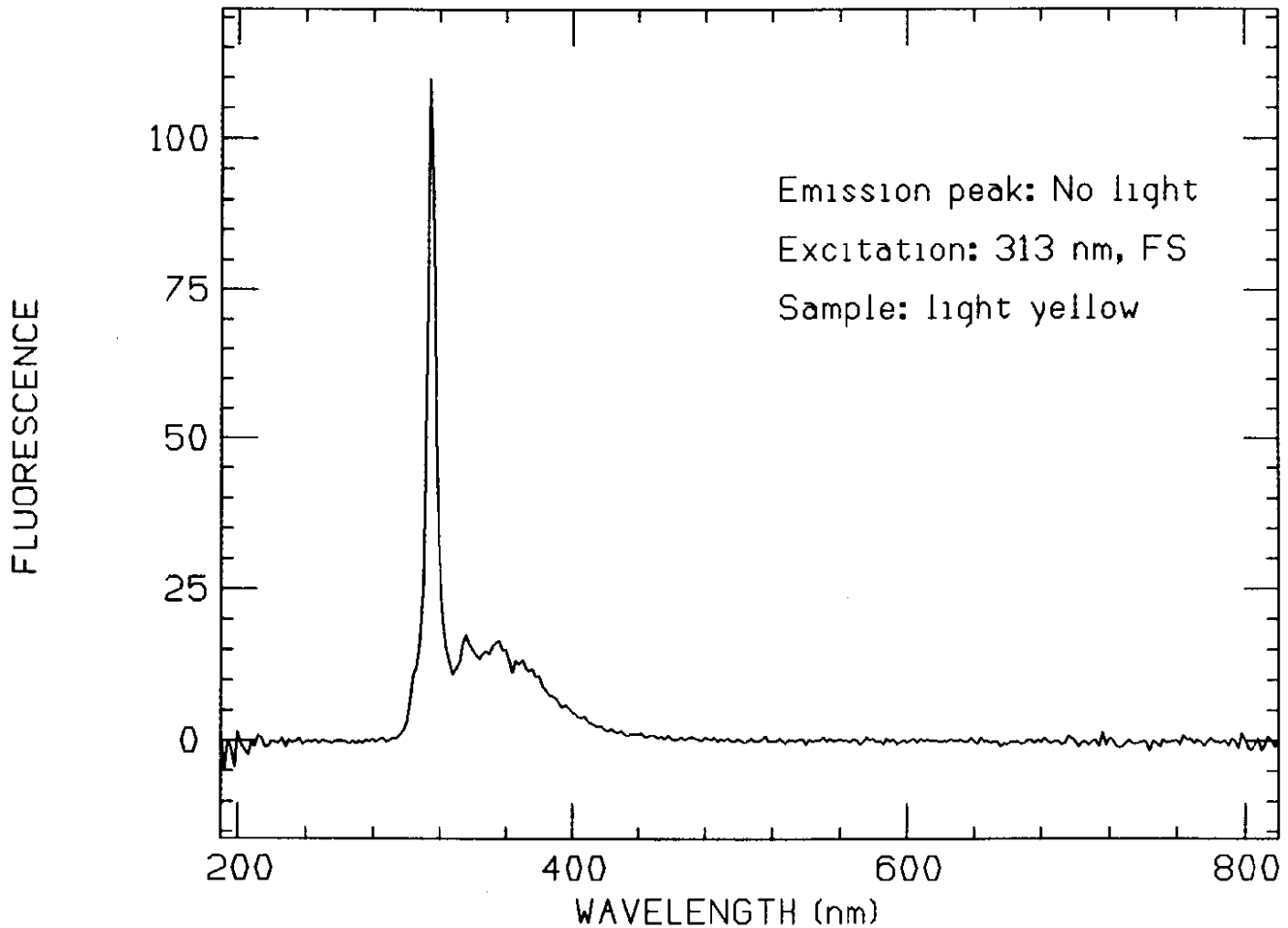
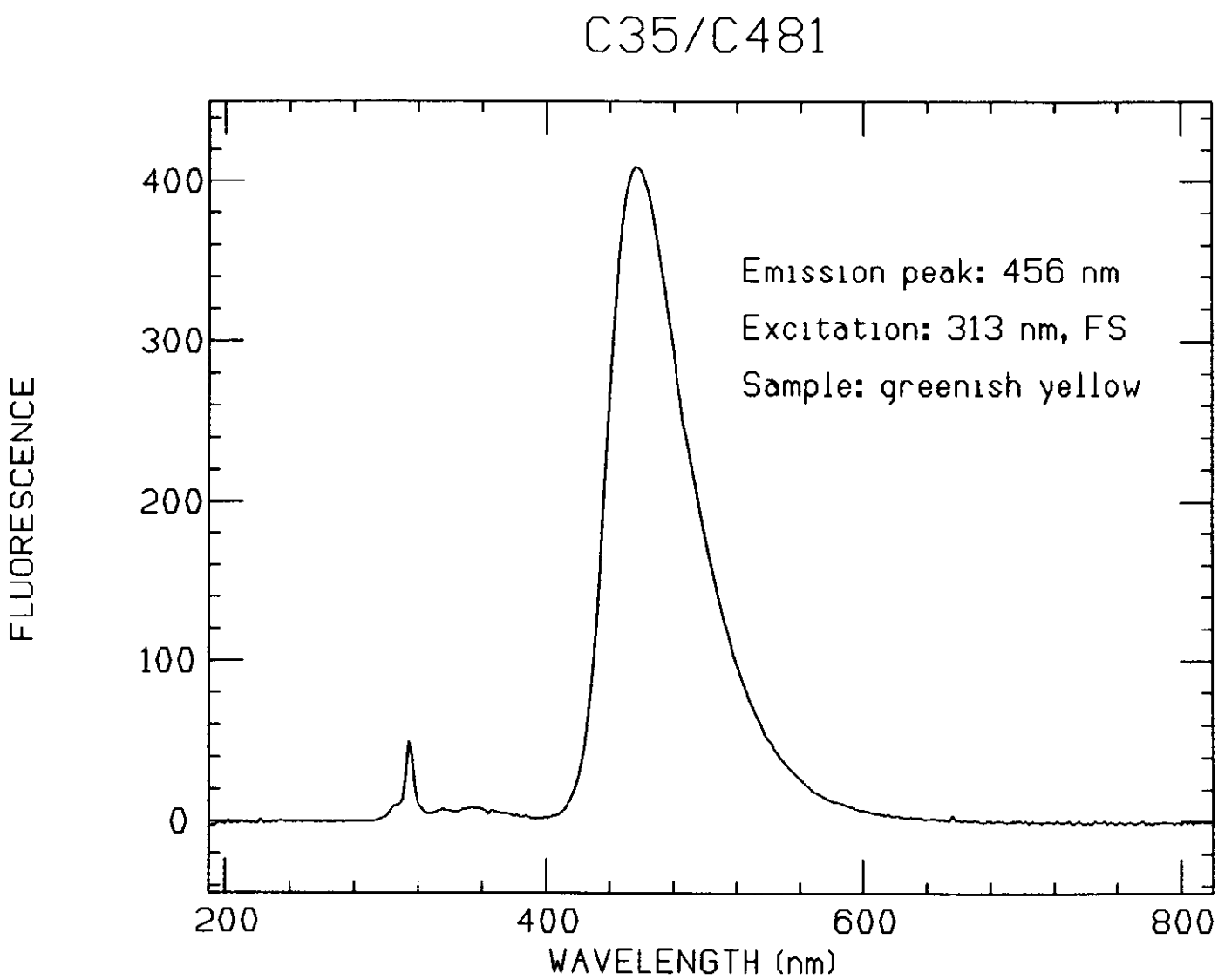
0
200
400
600
800
WAVELENGTH (nm)

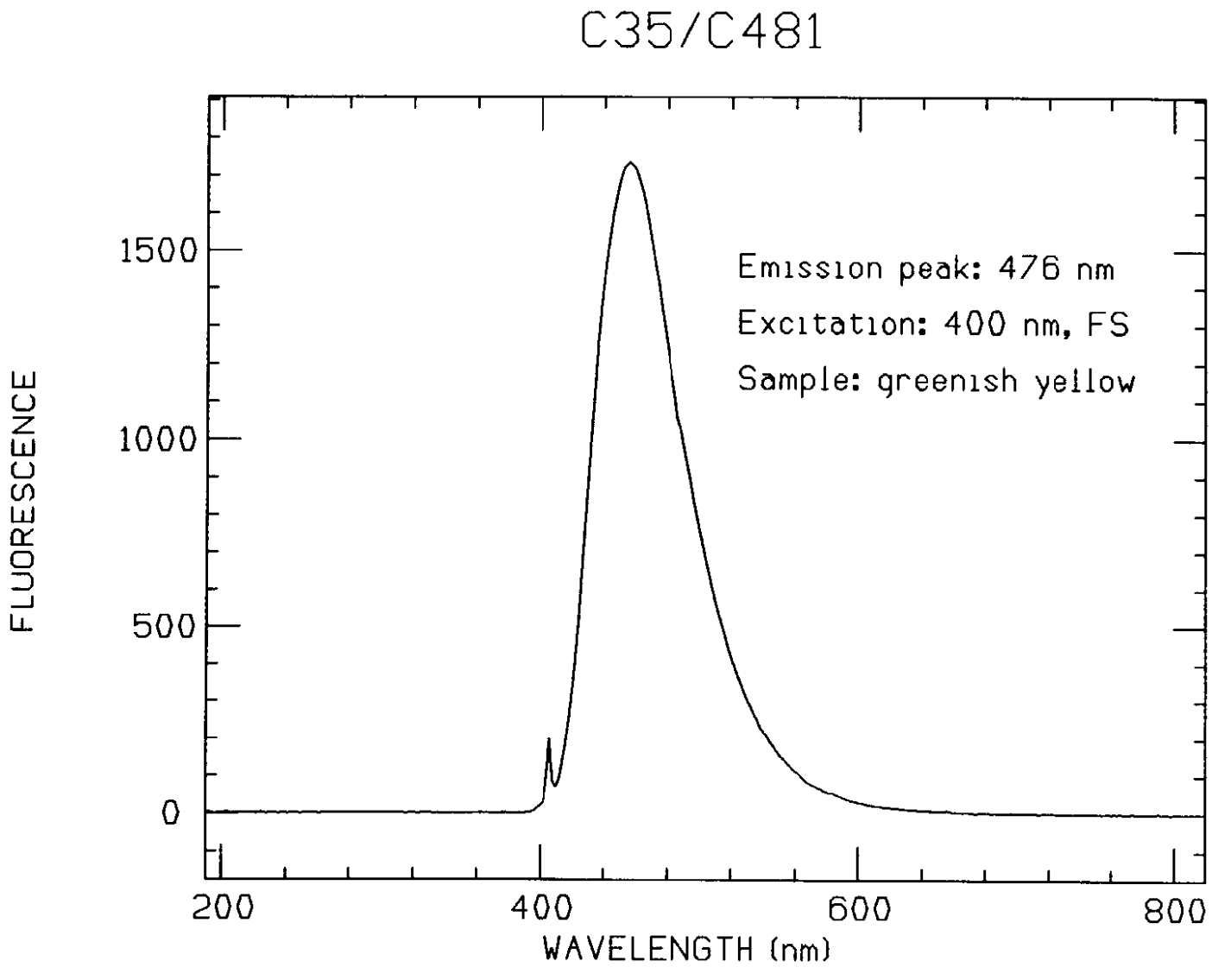

bis-MSB
Emission peak: 406,426 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
200
400
600
800
WAVELENGTH (nm)

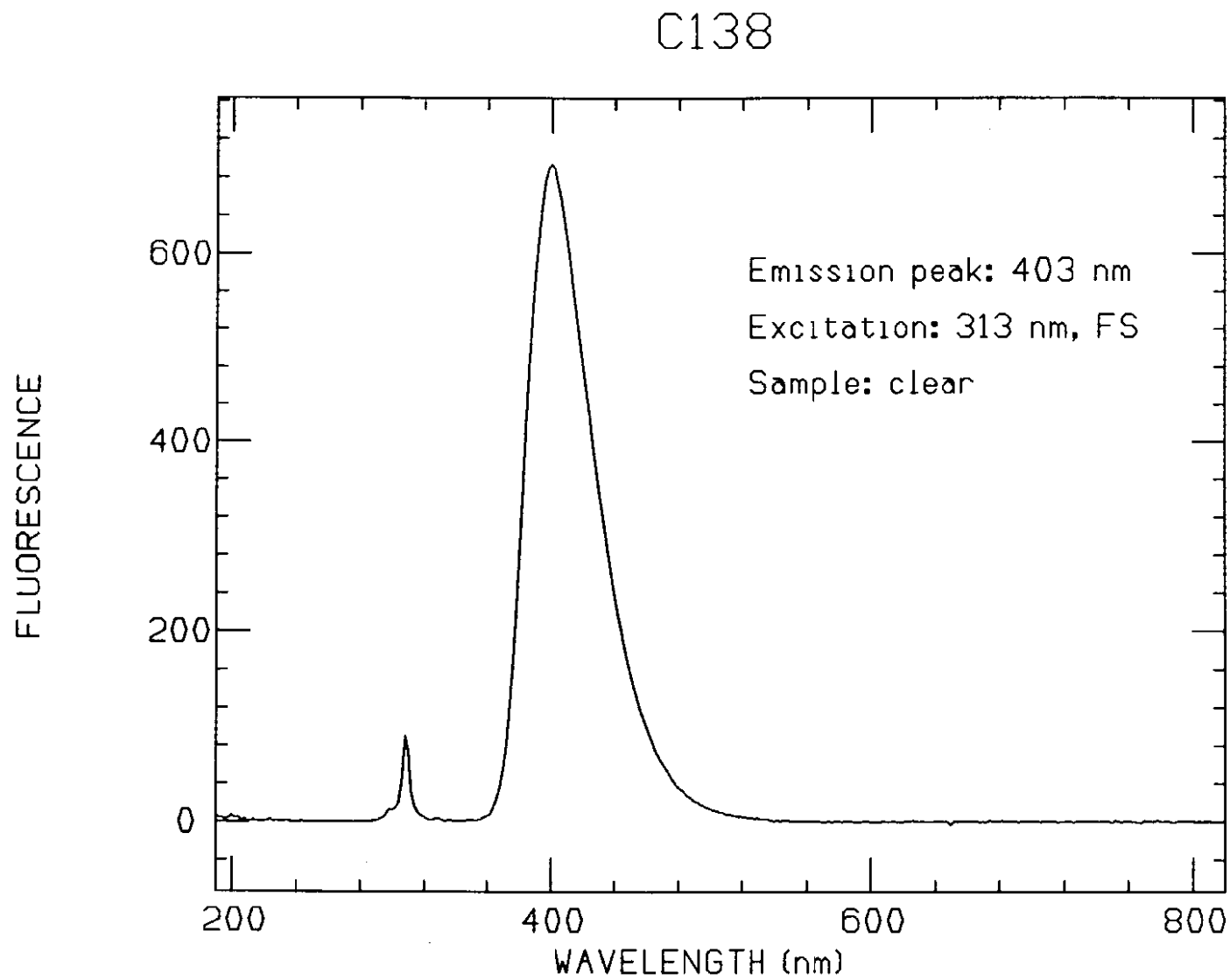

bis-MSB
Emission peak: 406,426 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1000
500
0
200
400
600
800
WAVELENGTH (nm)

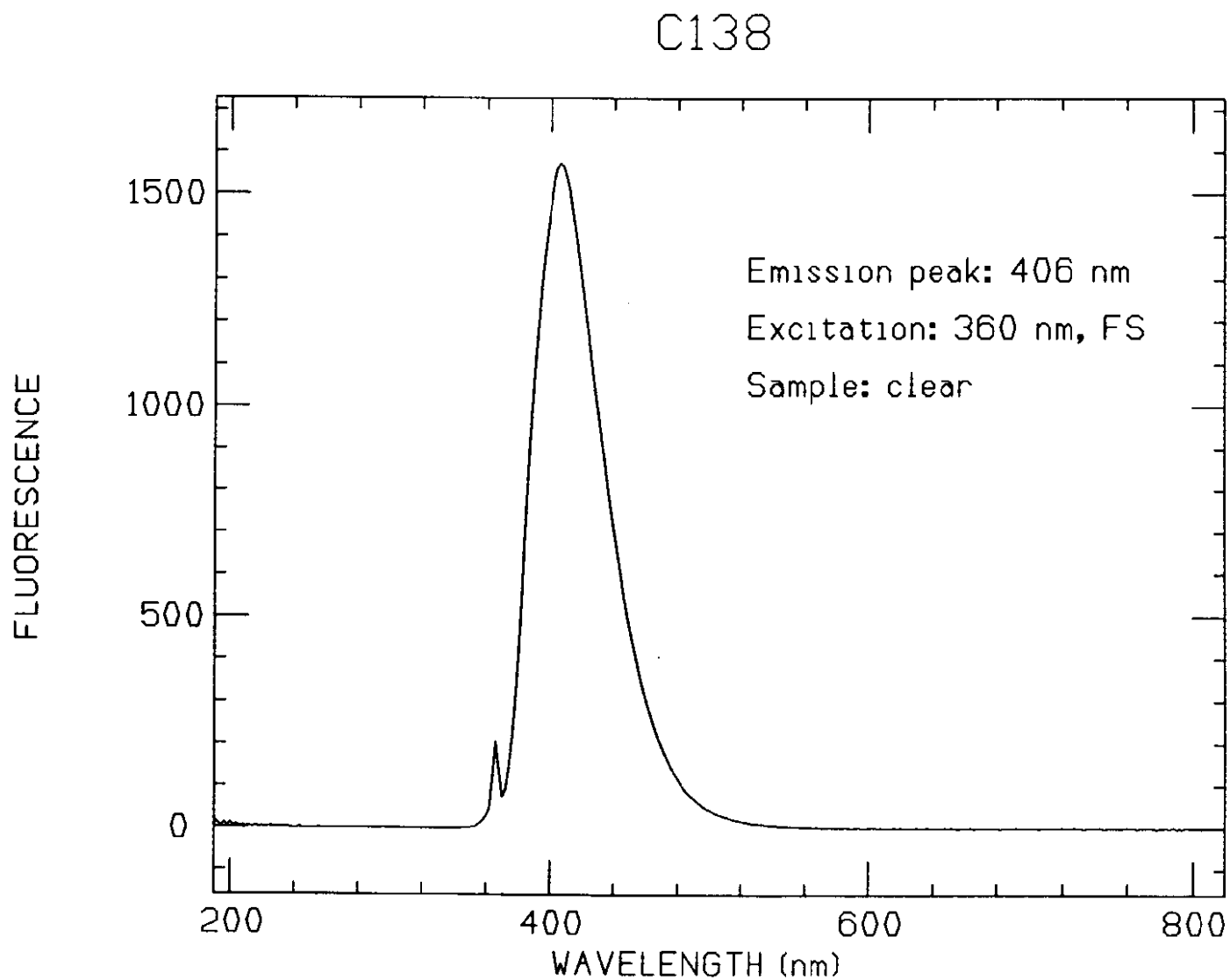
BRILLIANT SULFAFLAVIN

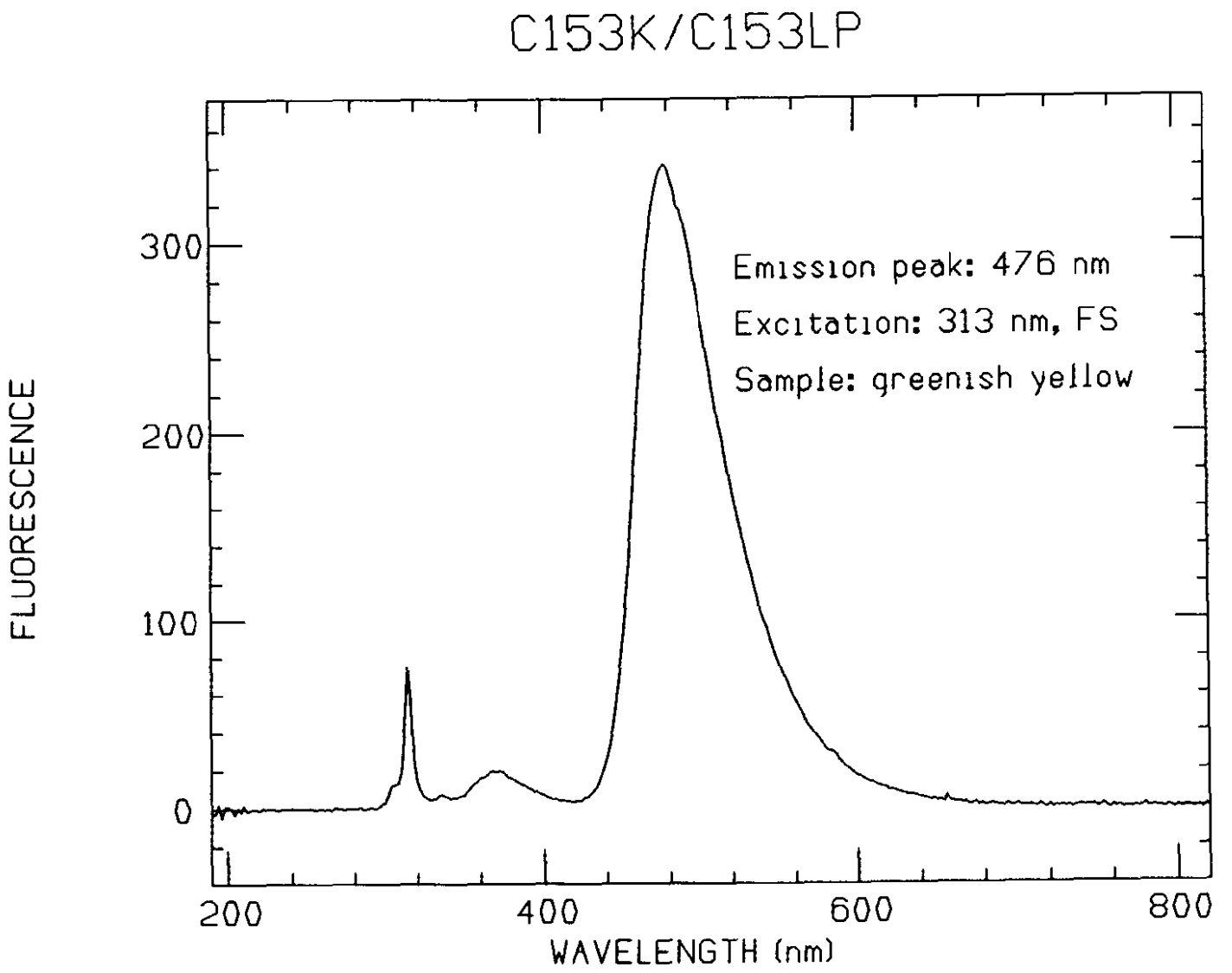


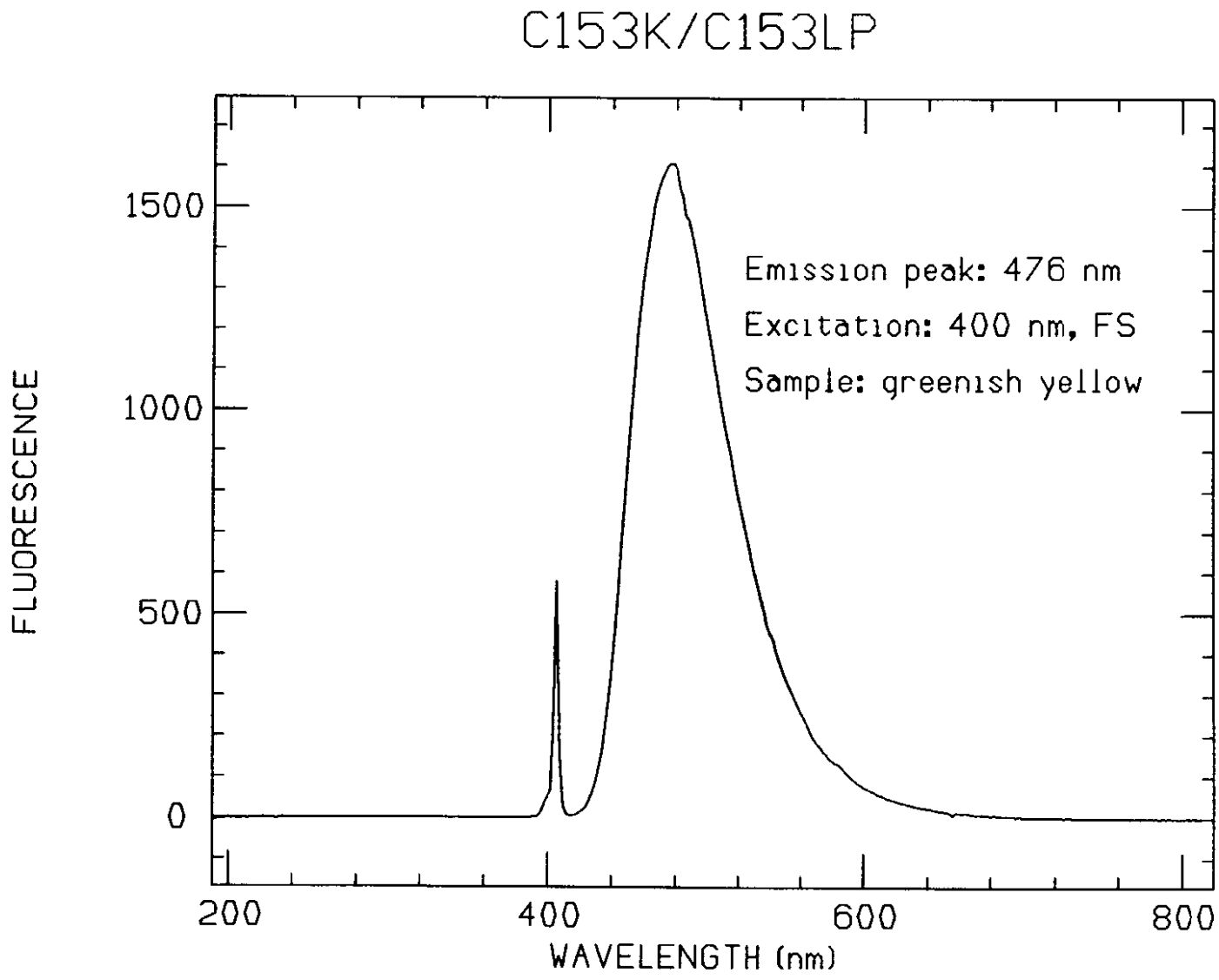

C35/C481
Emission peak: 456 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

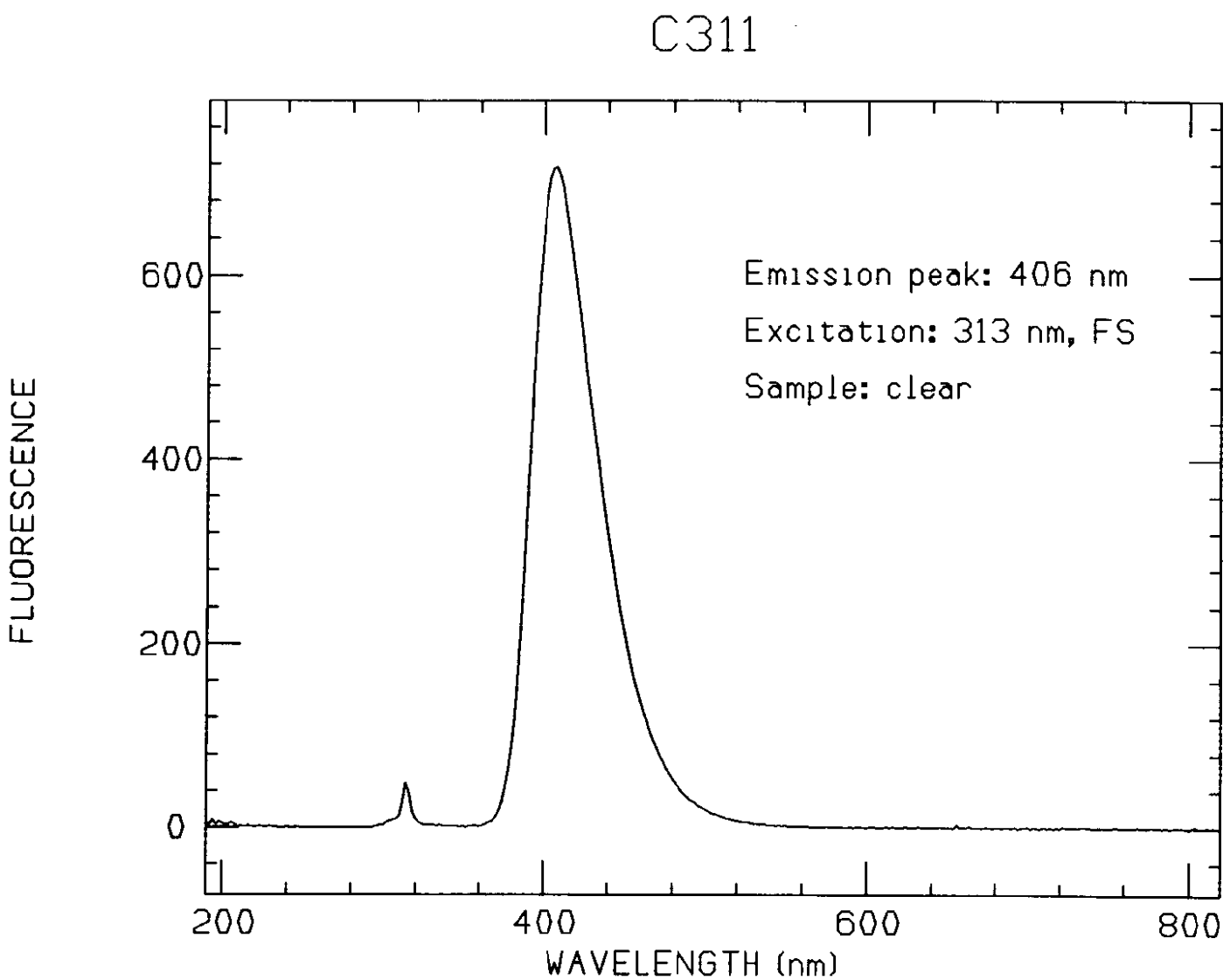

C35/C481
Emission peak: 476 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

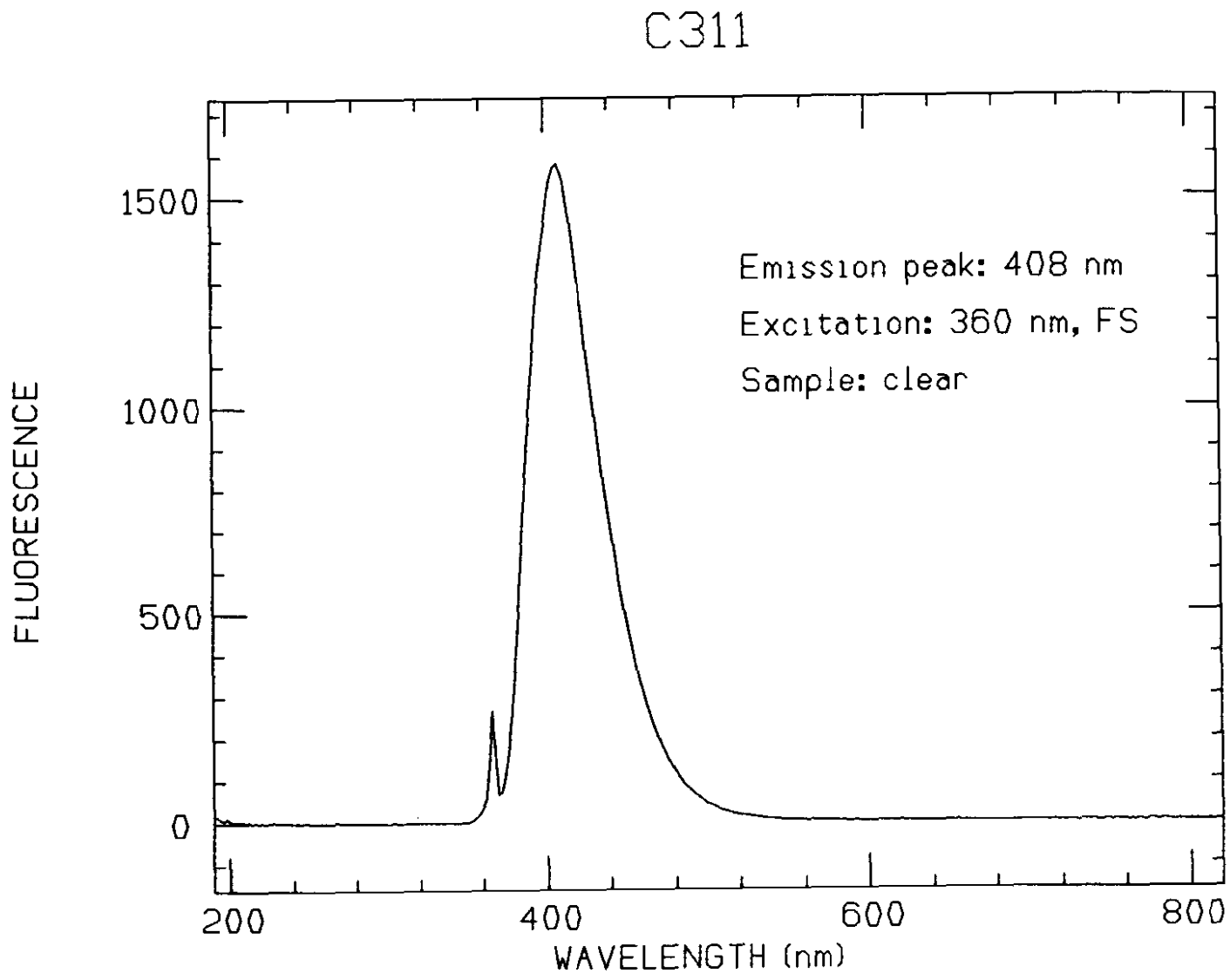

C138
Emission peak: 403 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

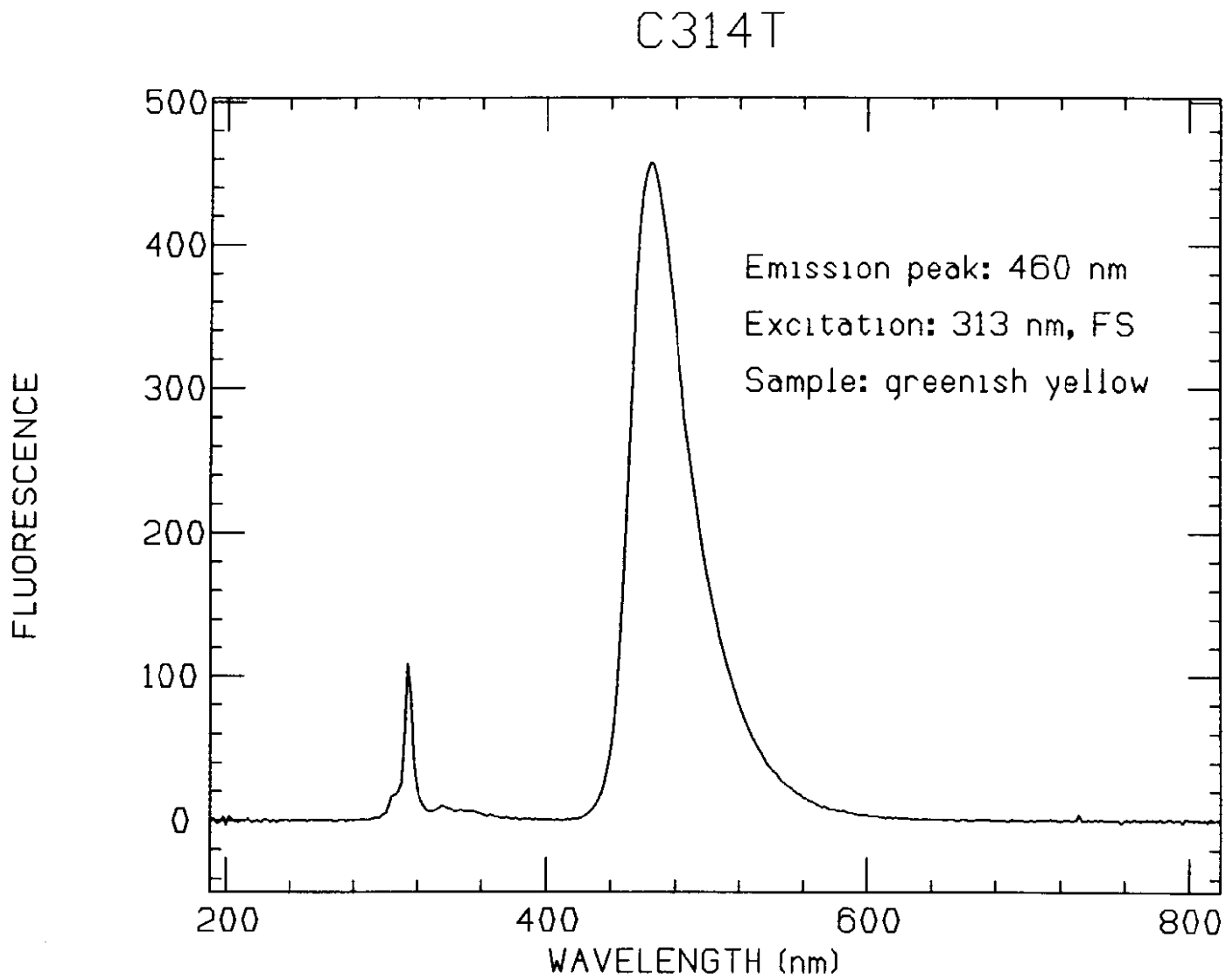

C138
Emission peak: 406 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

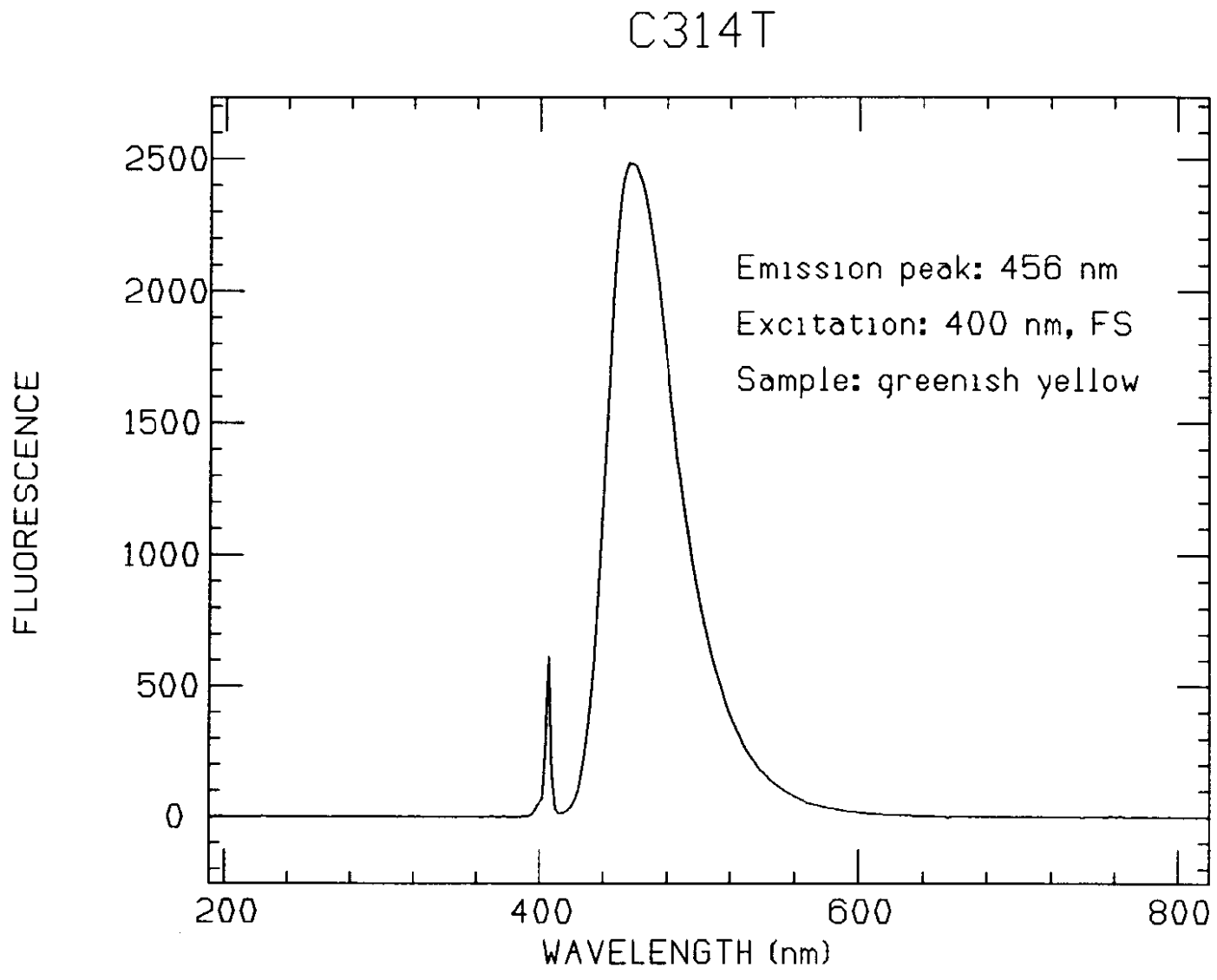

C153K/C153LP
Emission peak: 476 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

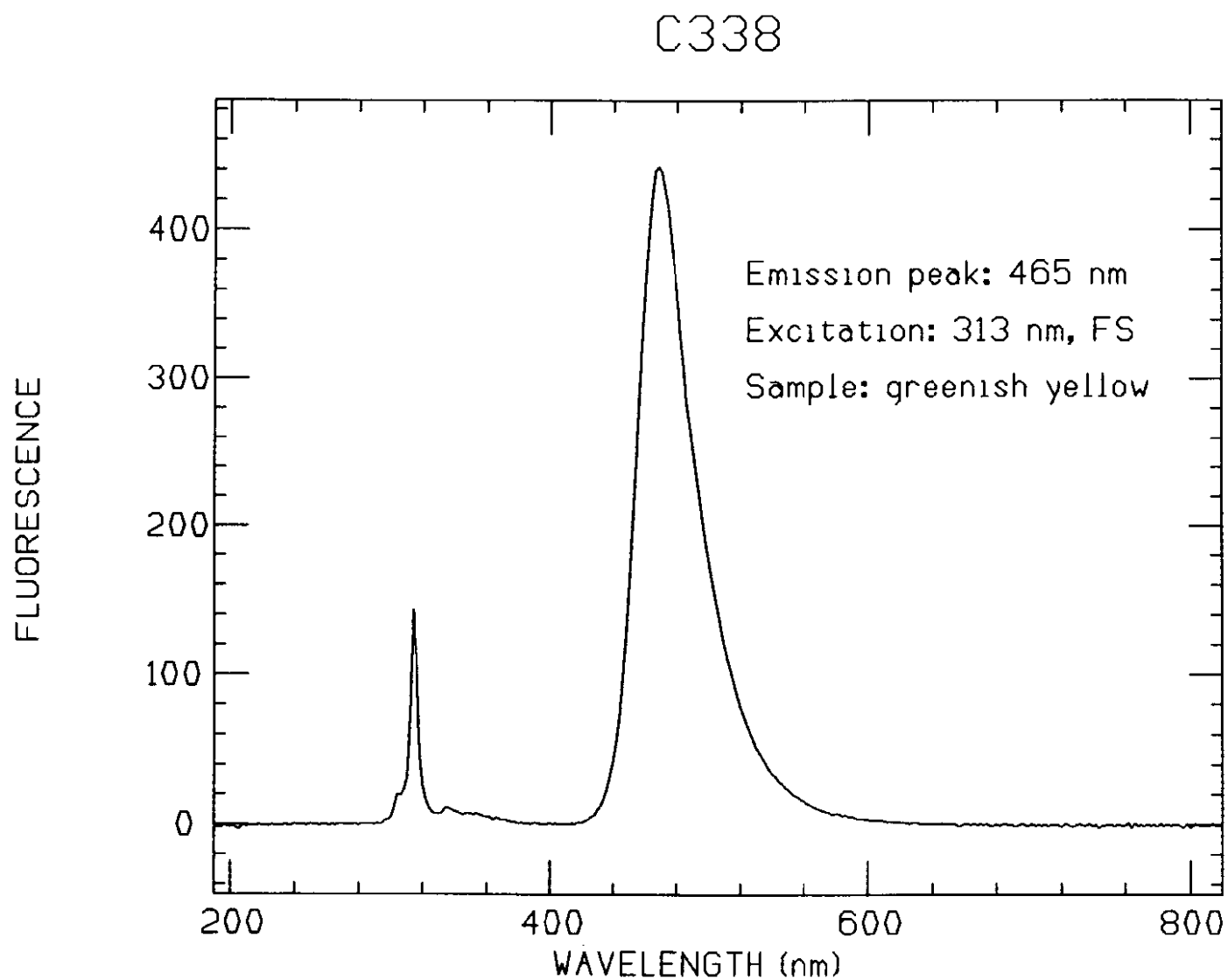

C153K/C153LP
Emission peak: 476 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

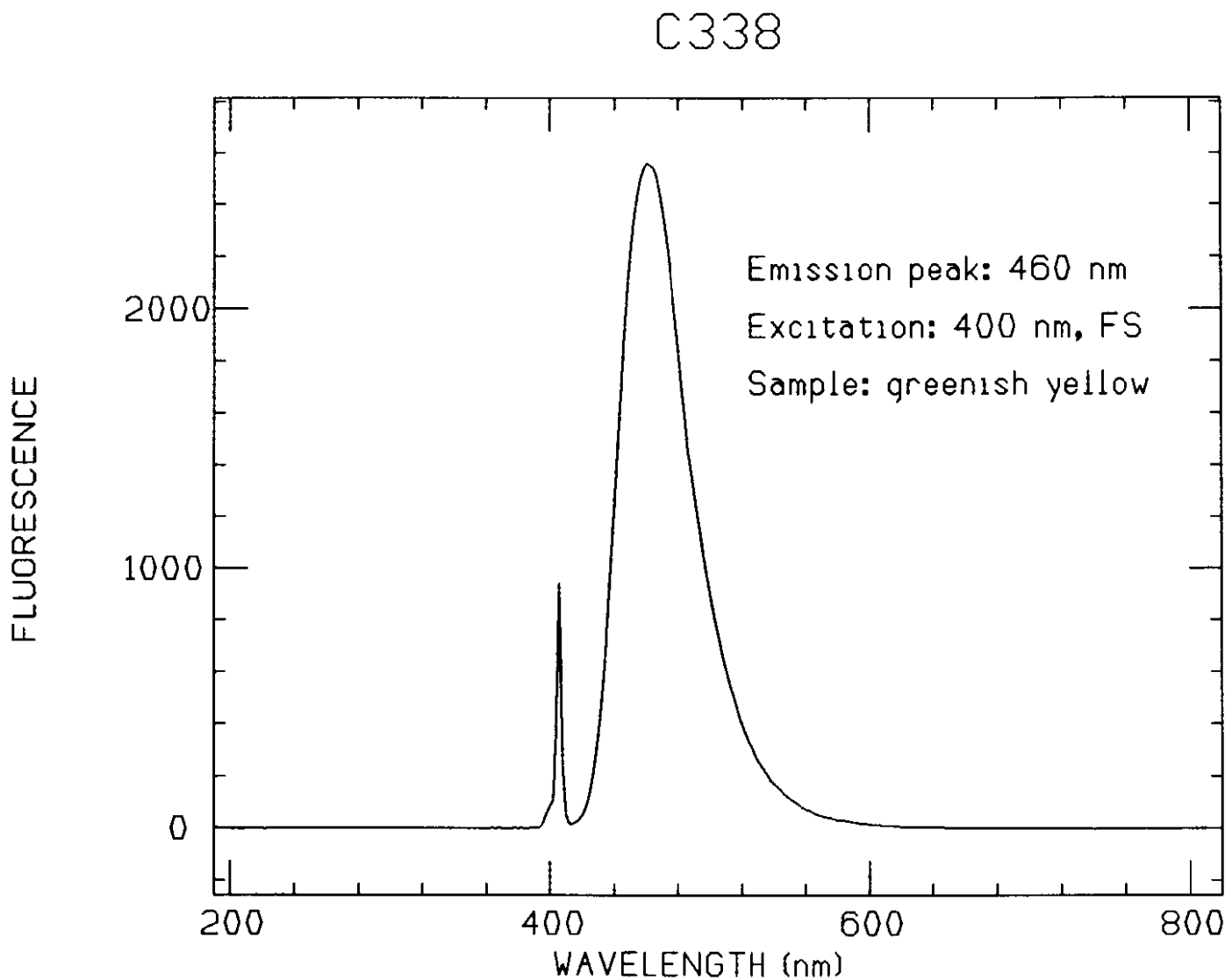

C311
Emission peak: 406 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

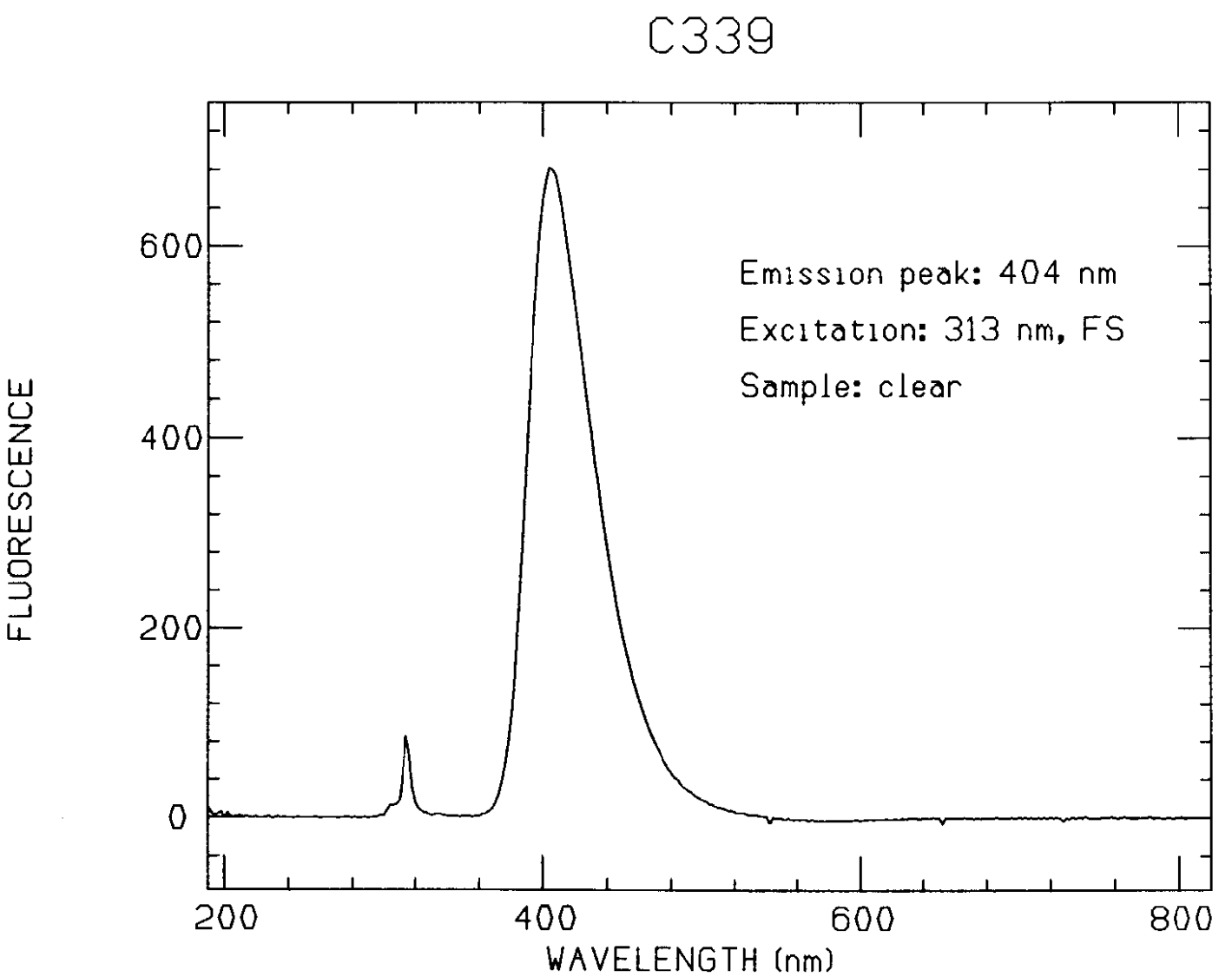

C311
Emission peak: 408 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

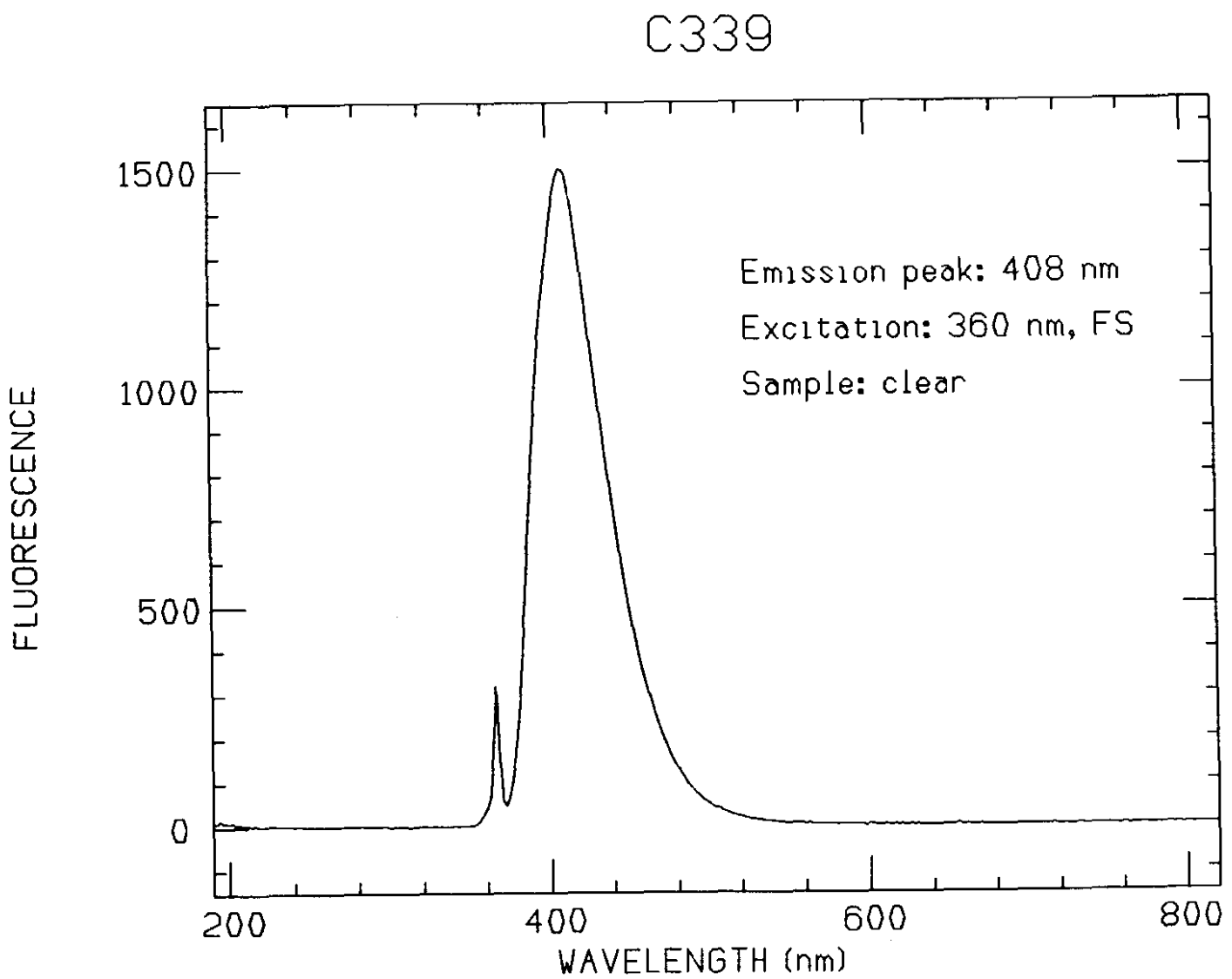

C314T
Emission peak: 460 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
500
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

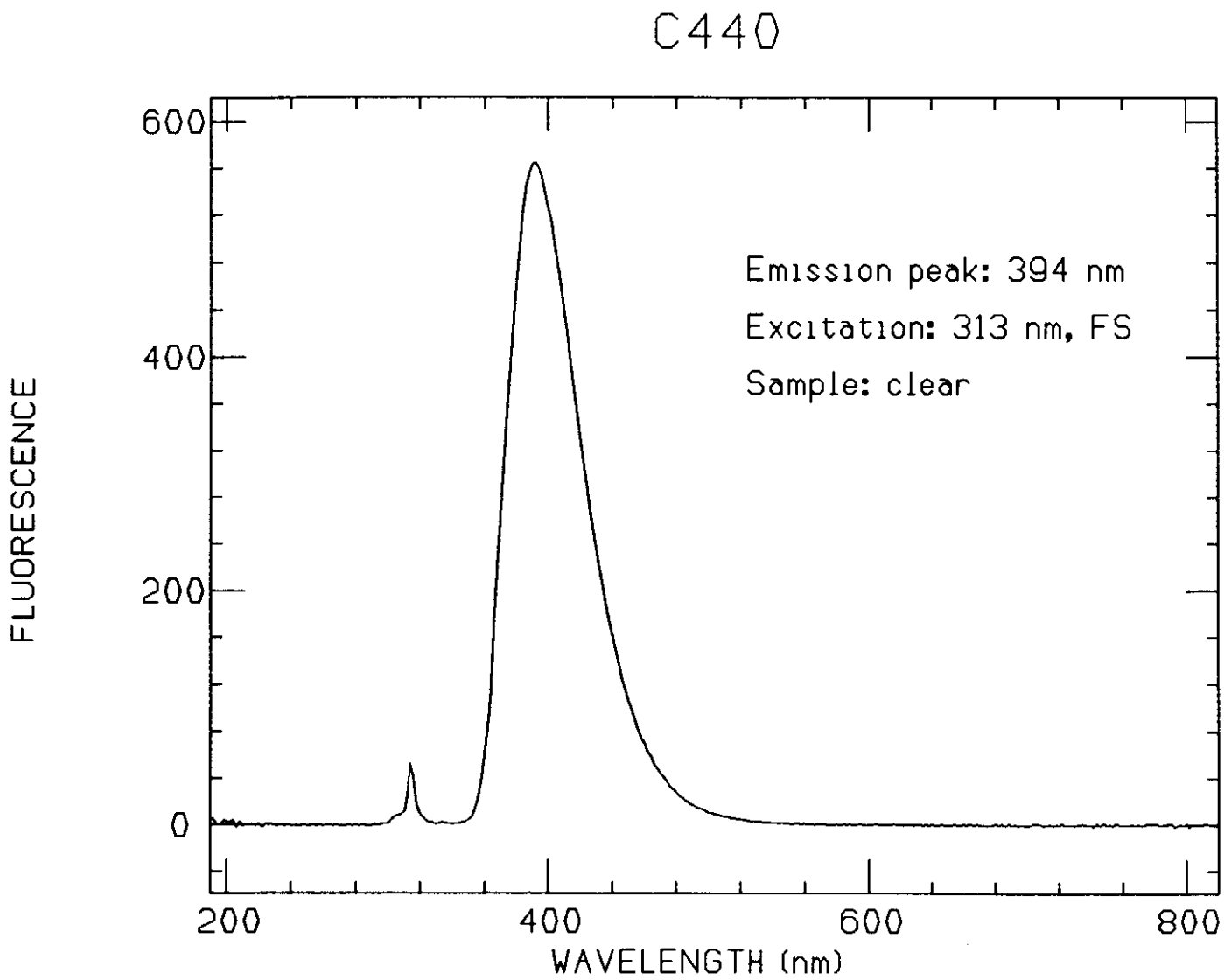

C314T
Emission peak: 456 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
2500
2000
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

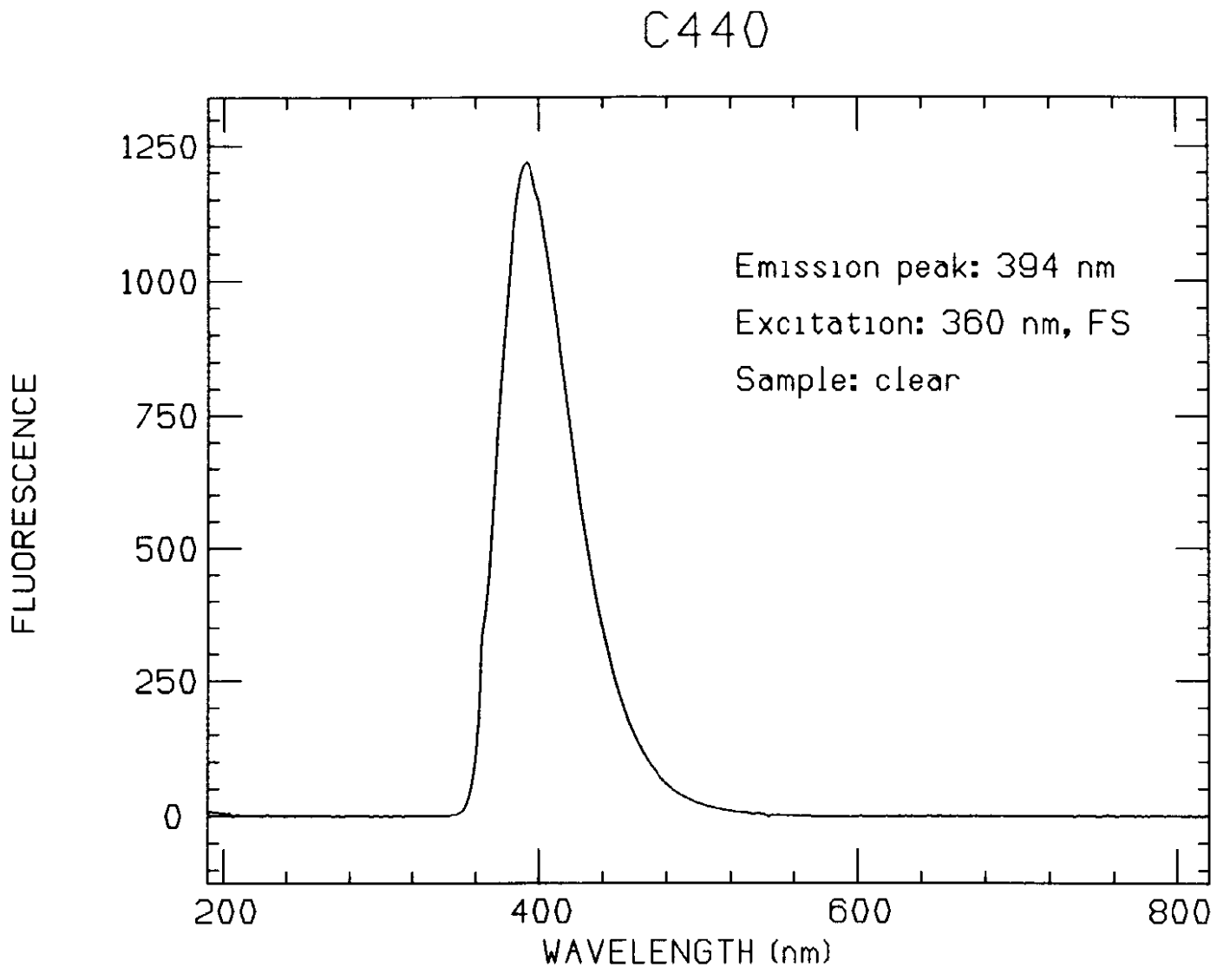

C338
Emission peak: 465 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
0
100
200
300
400
200
400
600
800
WAVELENGTH (nm)

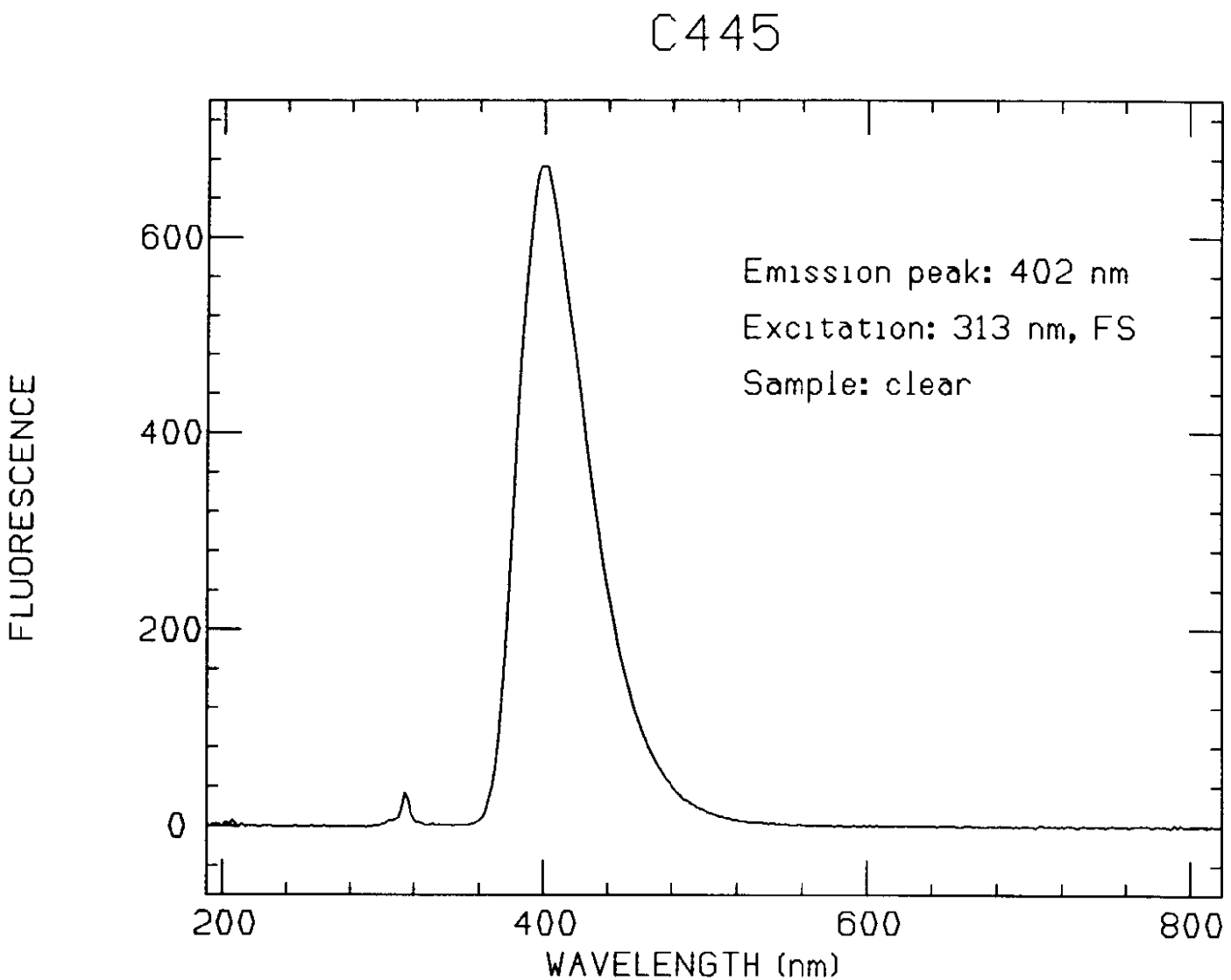

C338
Emission peak: 460 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
2000
1000
0
200
400
600
800
WAVELENGTH (nm)

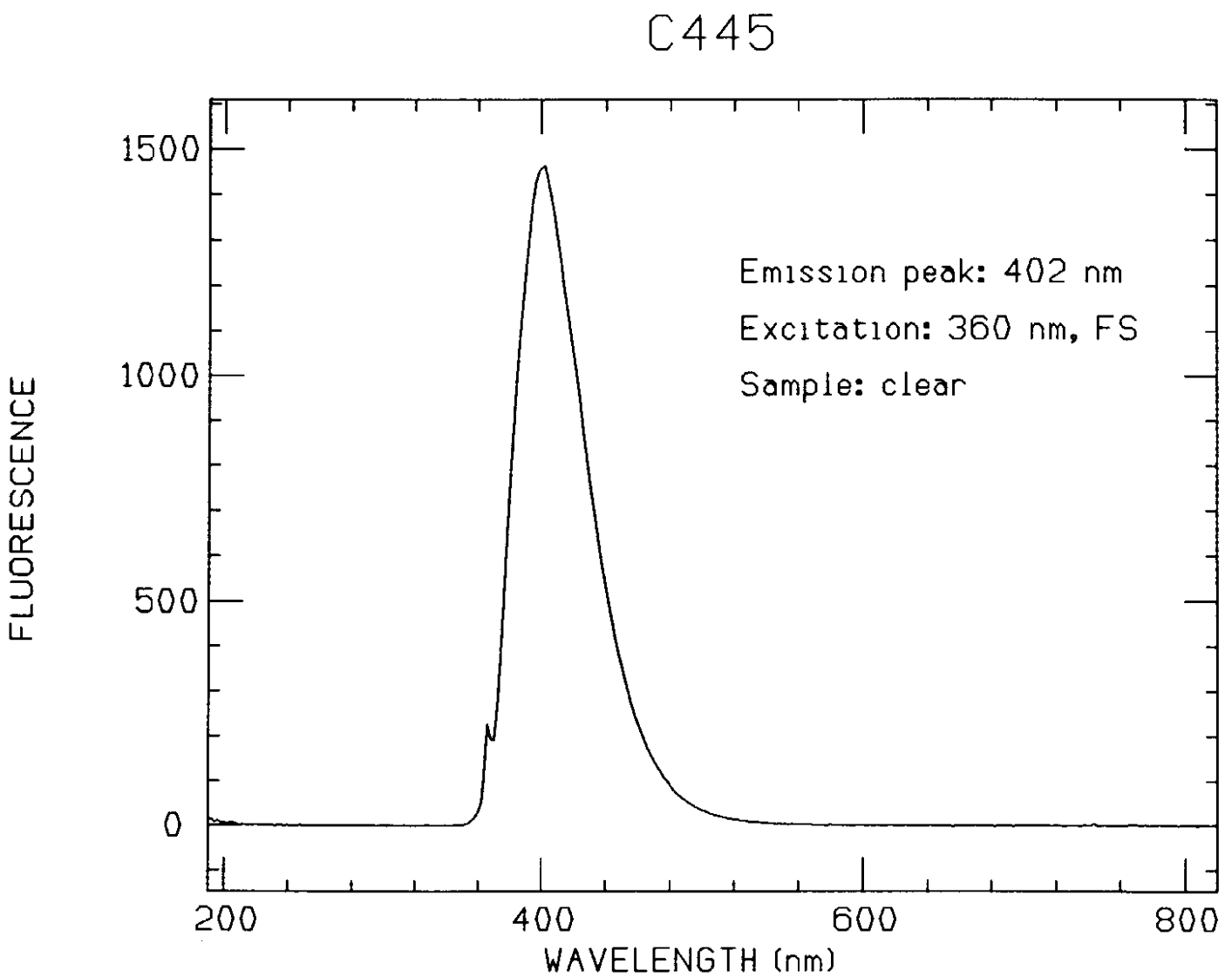

C339
Emission peak: 404 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

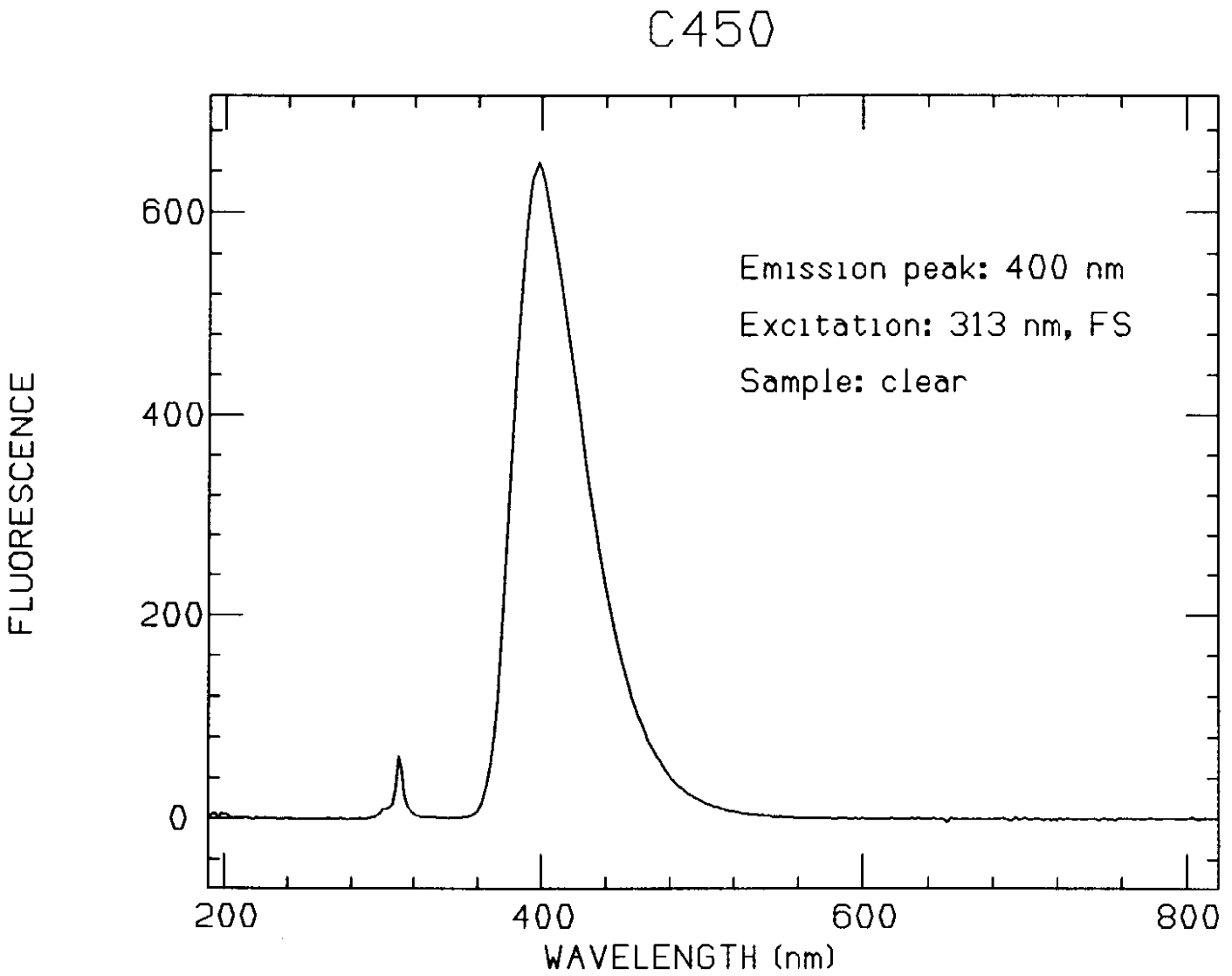

C339
Emission peak: 408 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

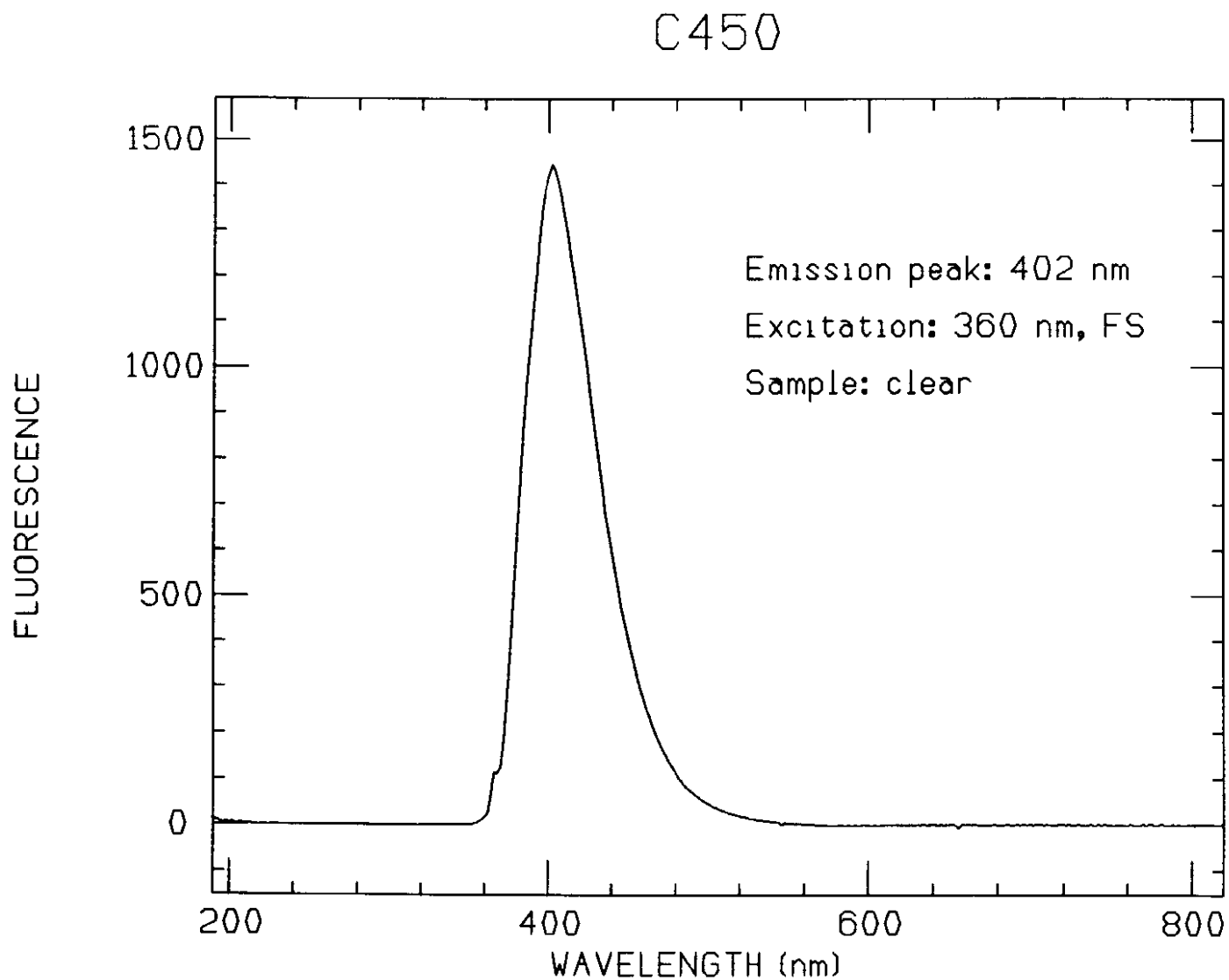

C440
Emission peak: 394 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
600
400
200
0
200
400
600
800
WAVELENGTH (nm)

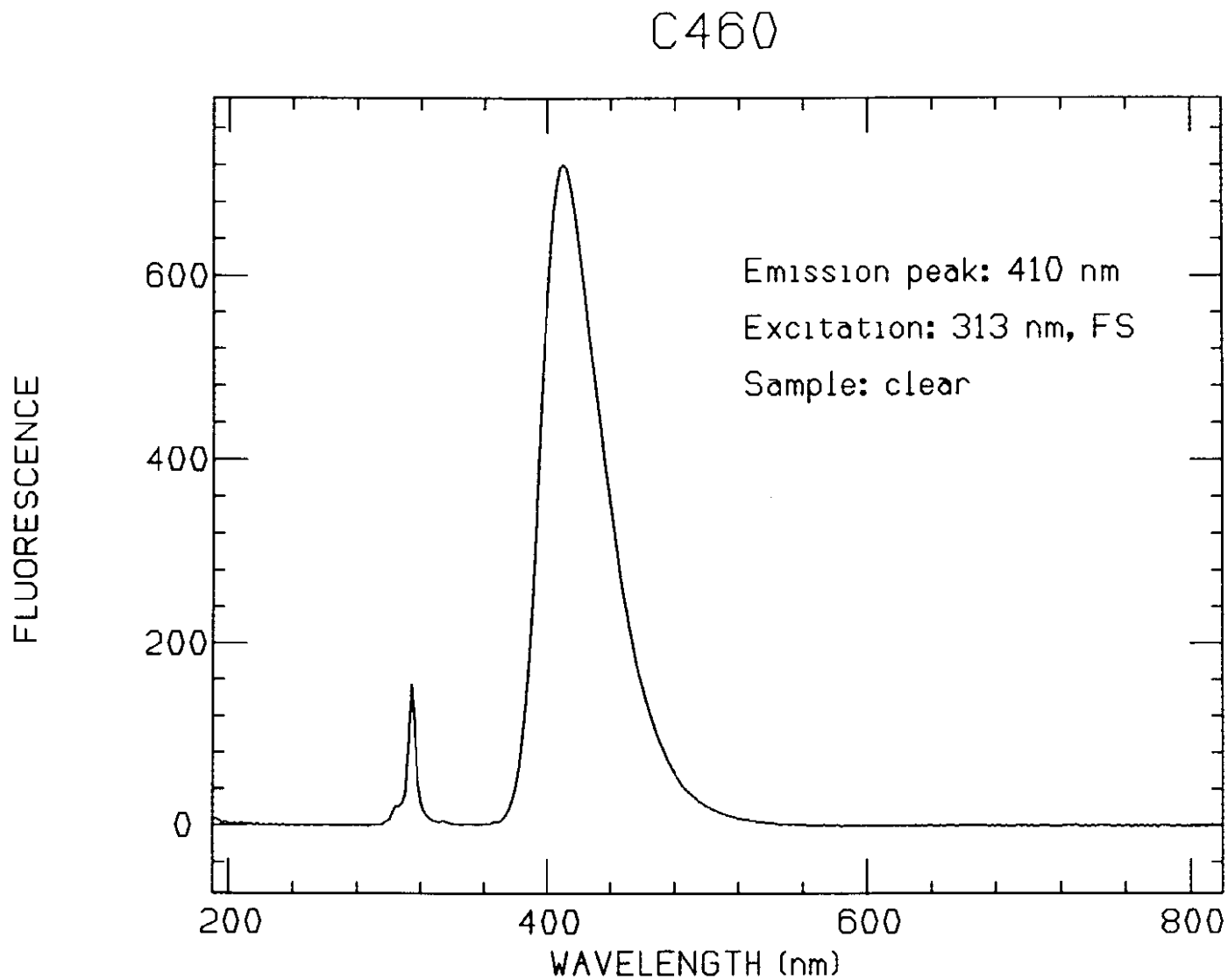

C440
Emission peak: 394 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1250
1000
750
500
250
0
200
400
600
800
WAVELENGTH (nm)

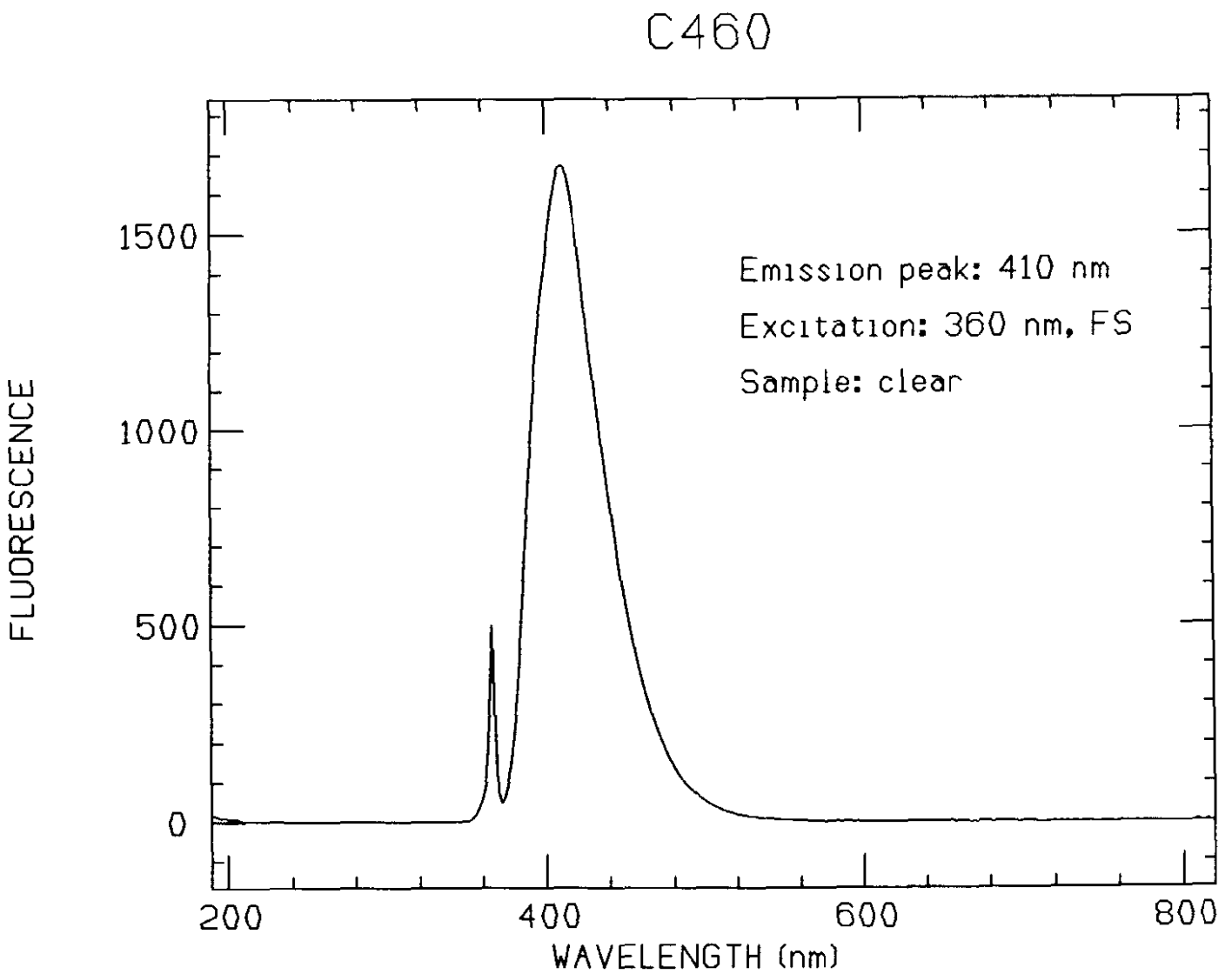

C445
Emission peak: 402 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

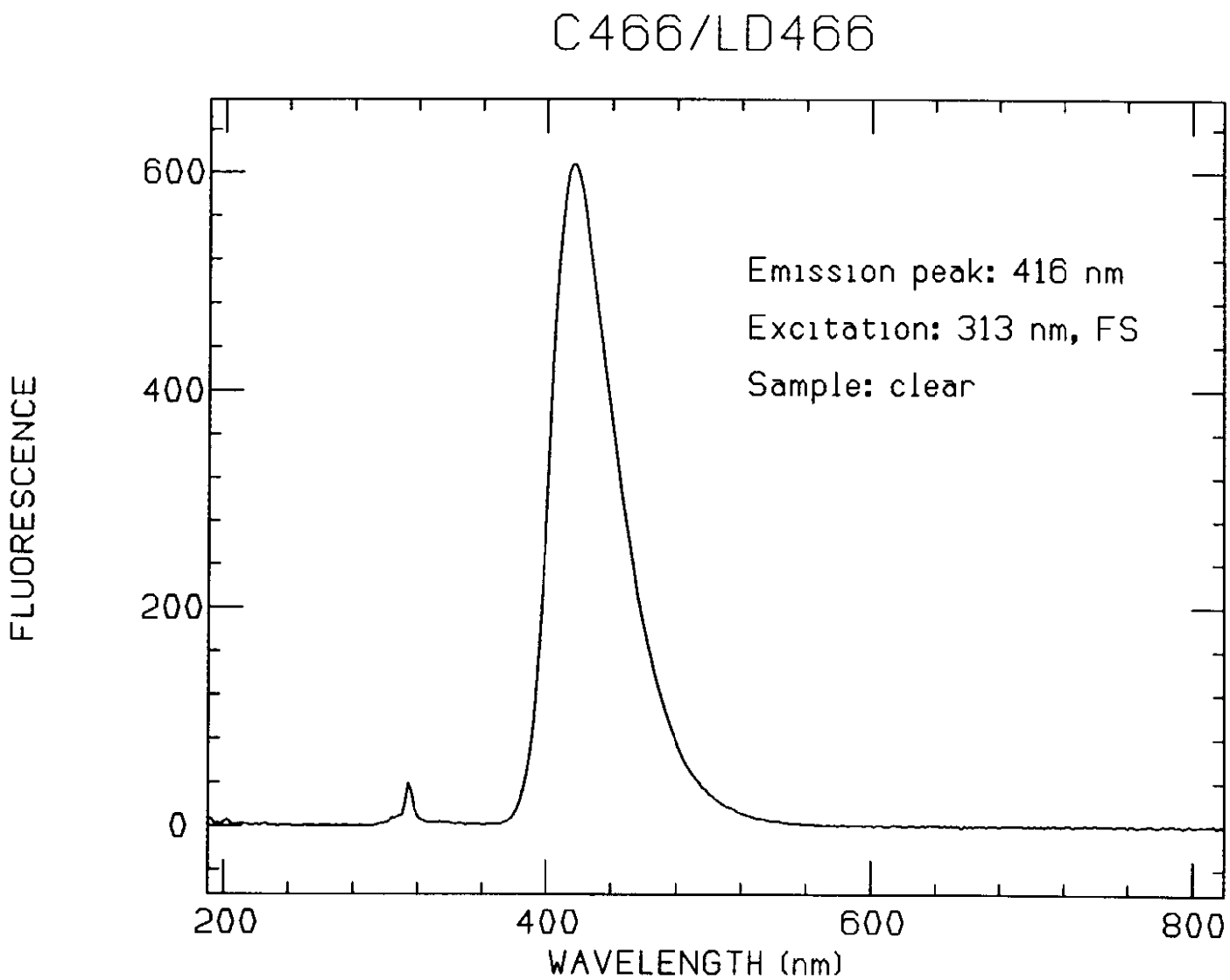

C445
Emission peak: 402 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

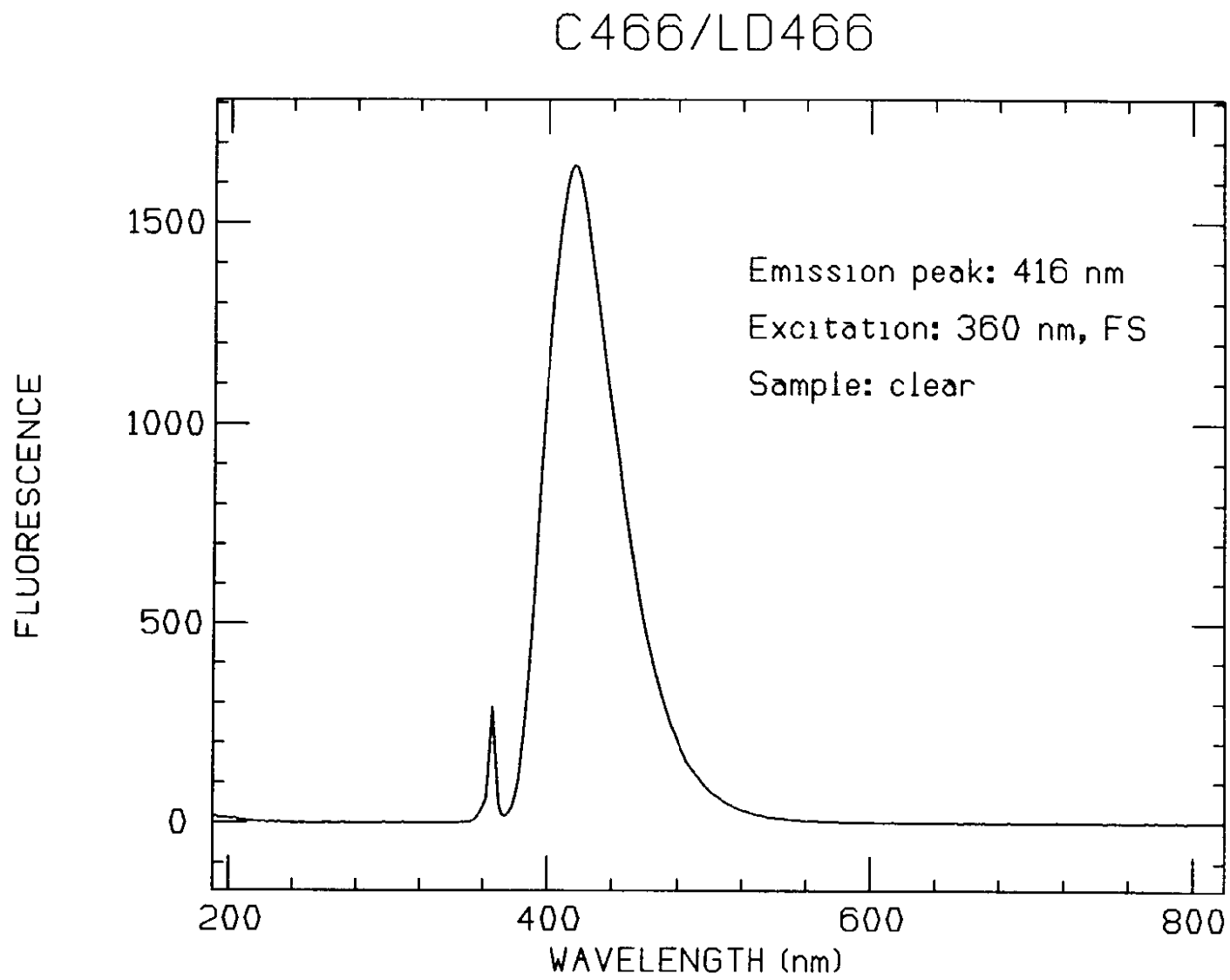

C450
Emission peak: 400 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

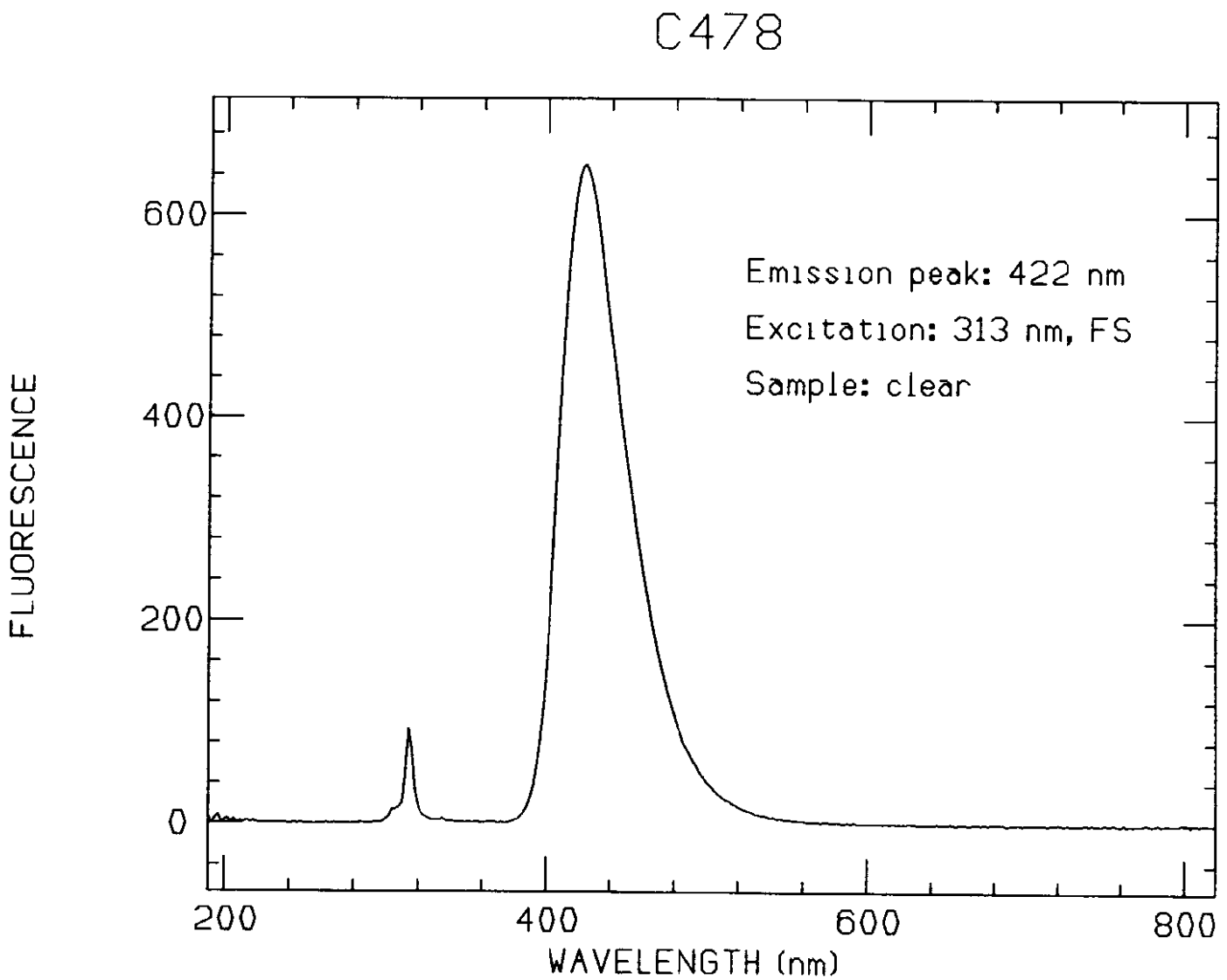

C450
Emission peak: 402 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

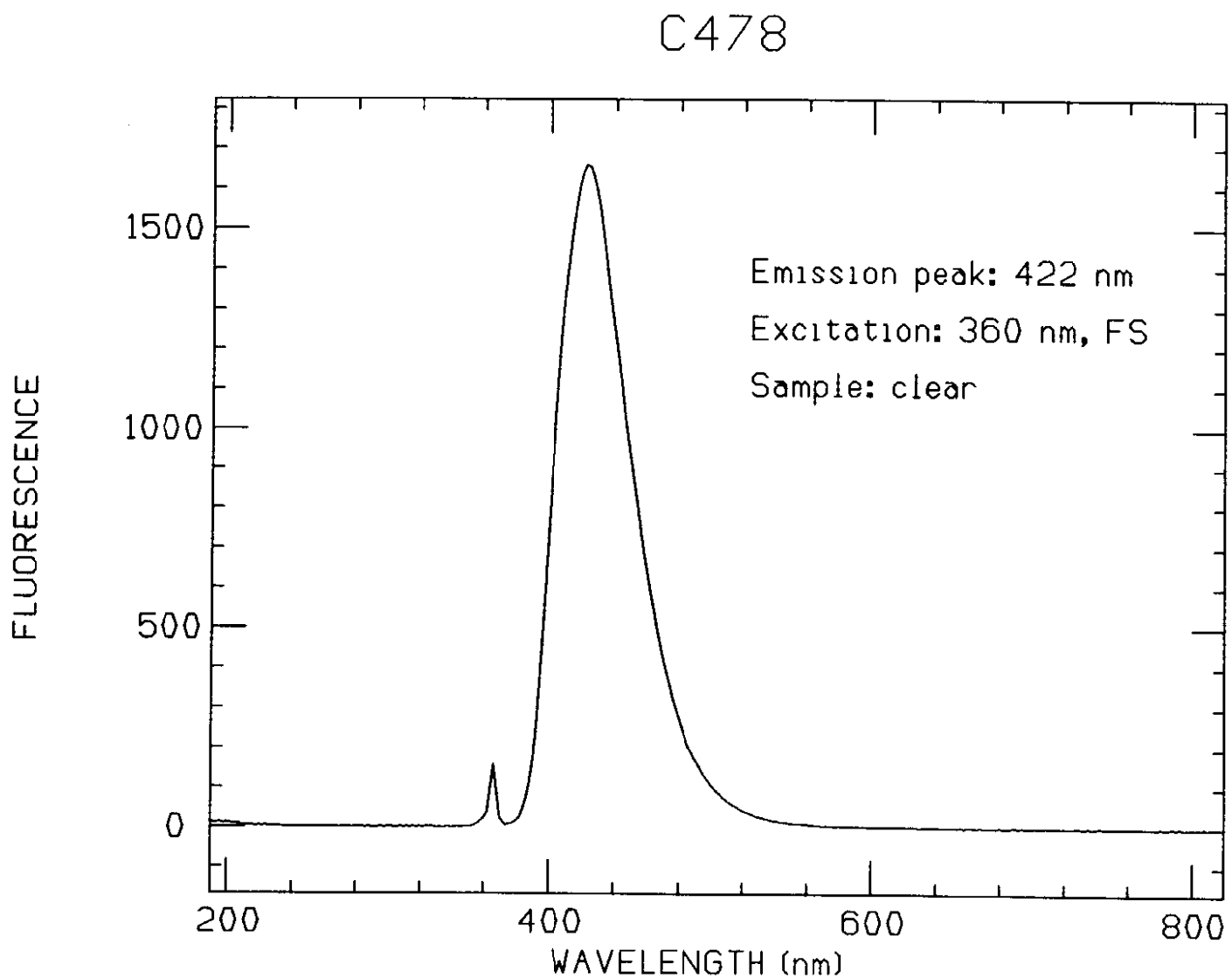

C460
Emission peak: 410 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

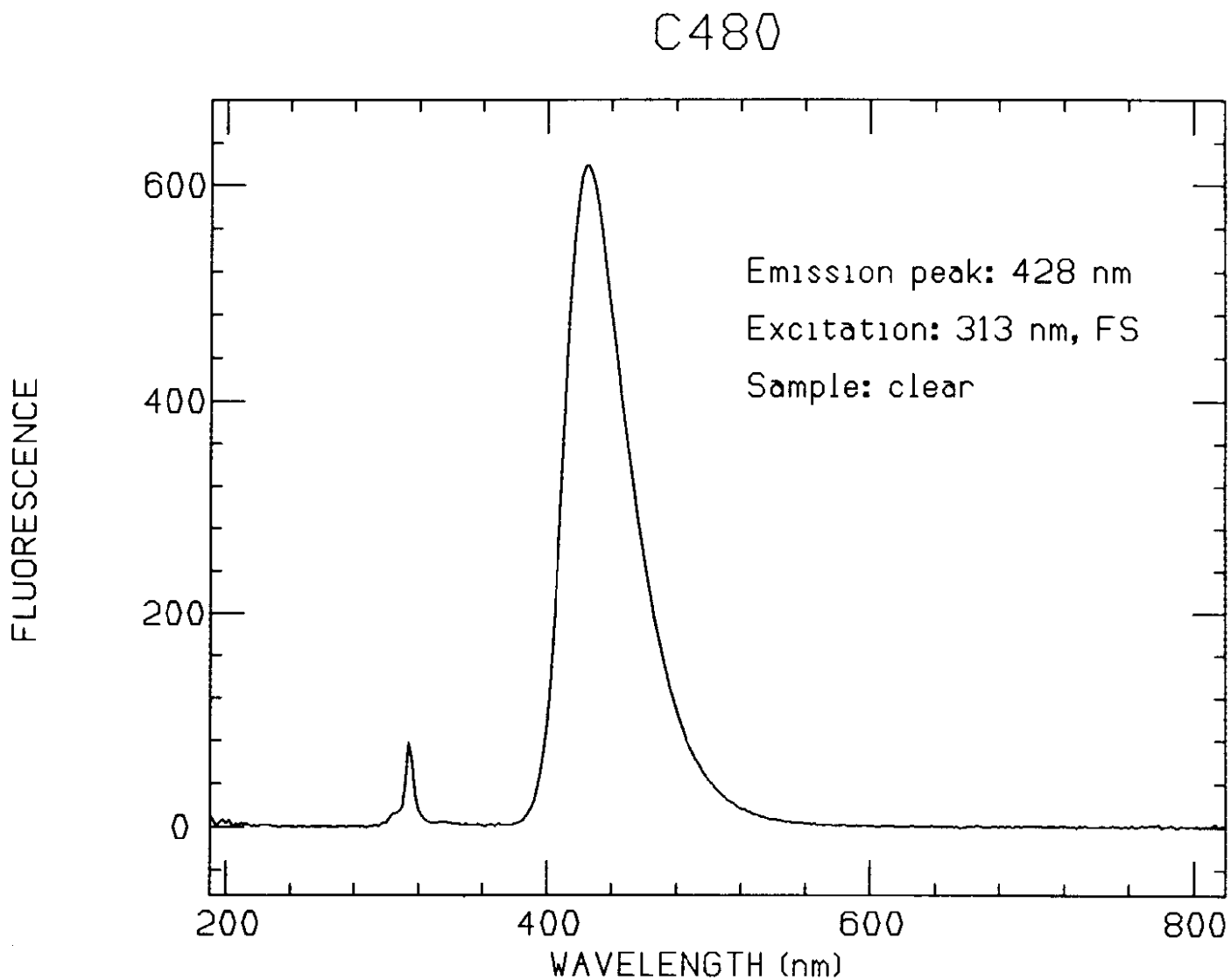

C460
Emission peak: 410 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

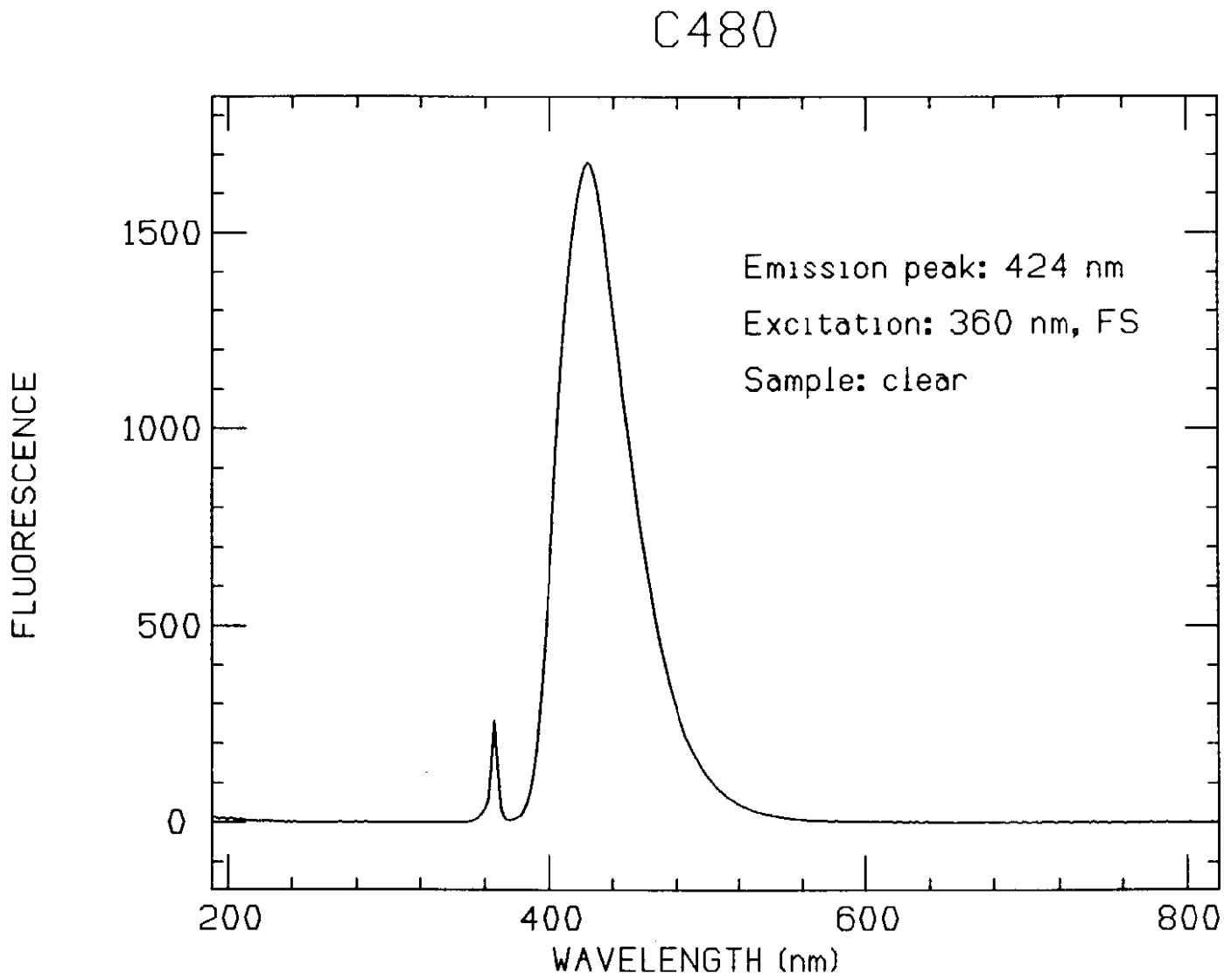

C466/LD466
Emission peak: 416 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
600
400
200
0
200
400
600
800
WAVELENGTH (nm)

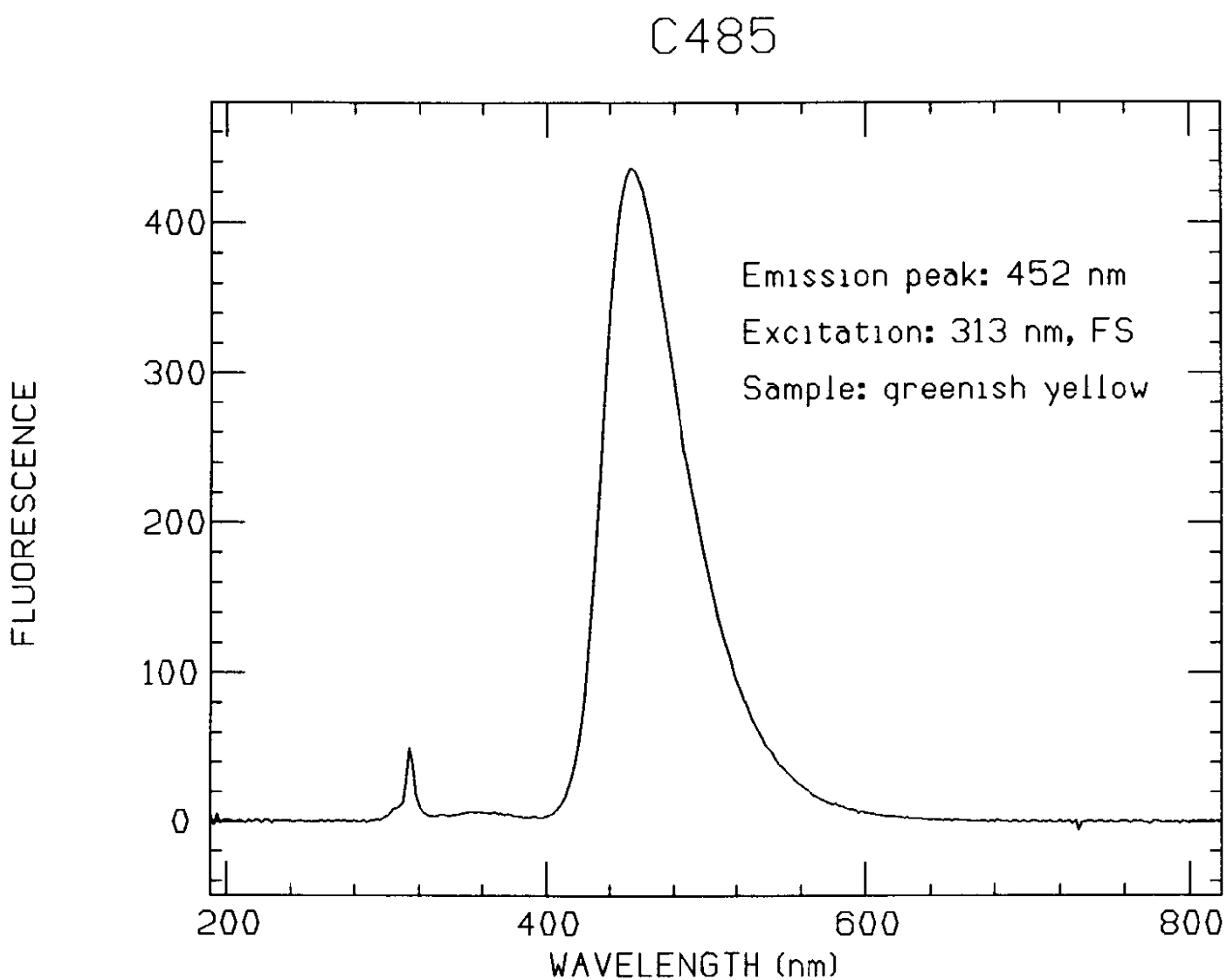

C466/LD466
Emission peak: 416 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

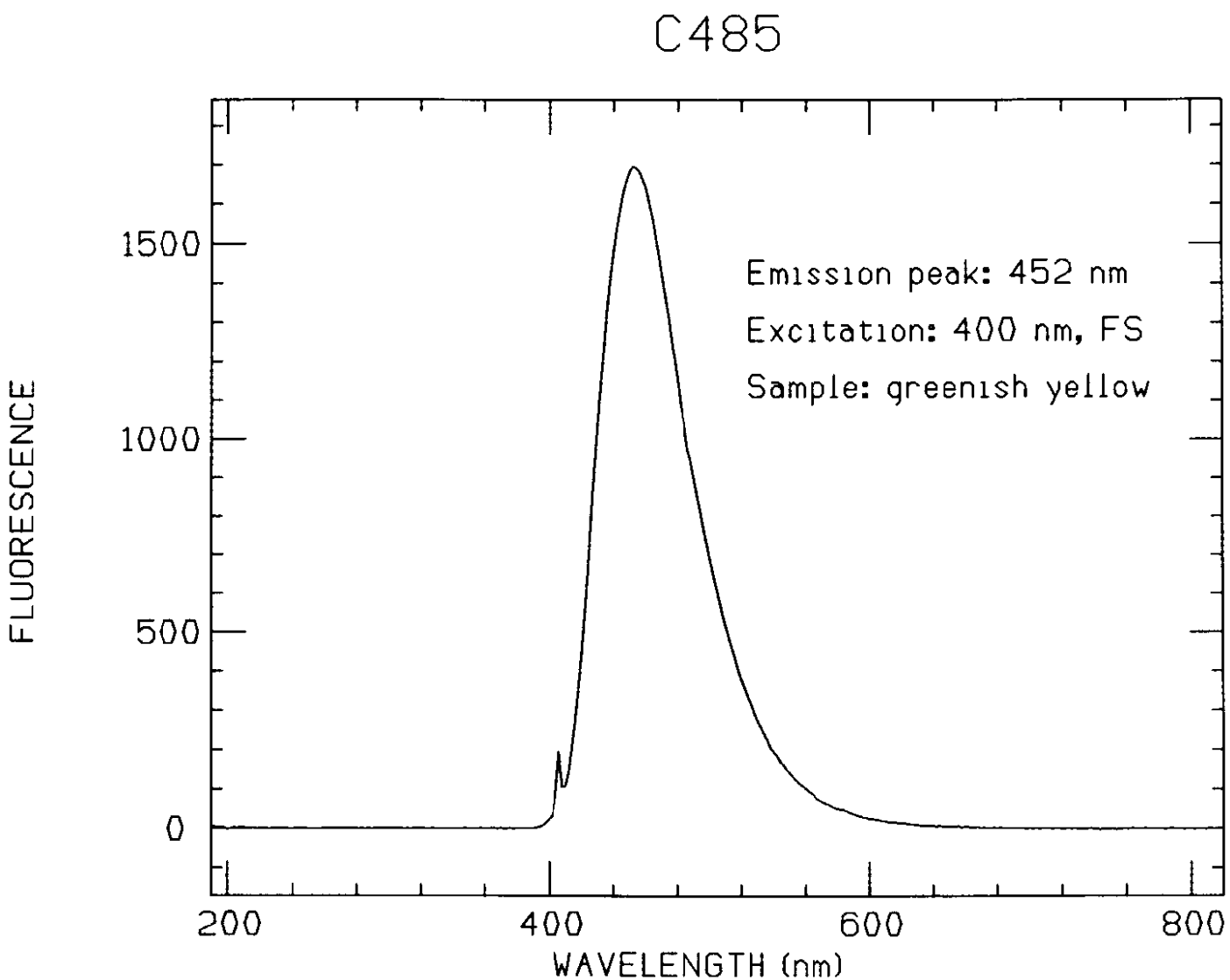

C478
Emission peak: 422 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

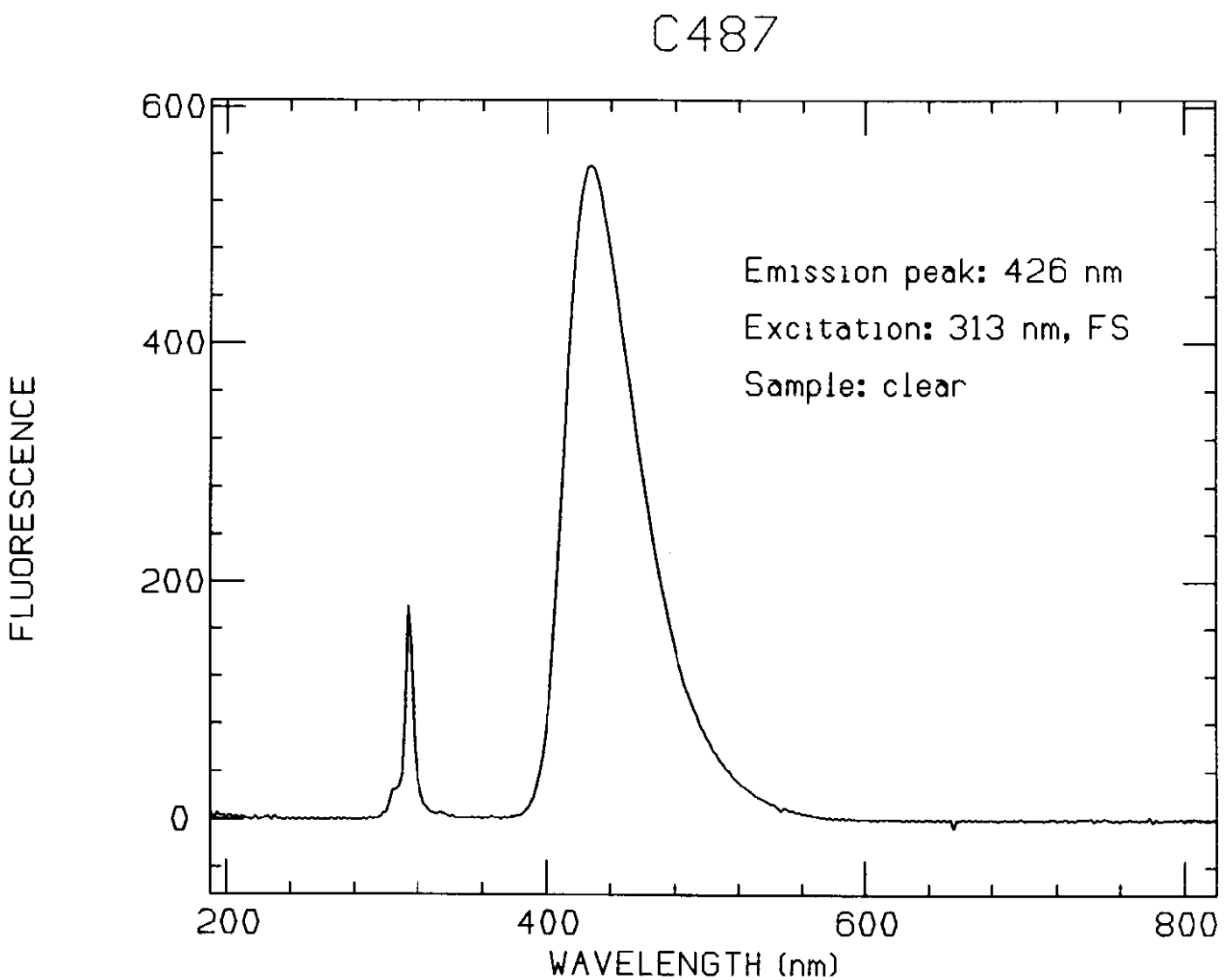

C478
Emission peak: 422 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

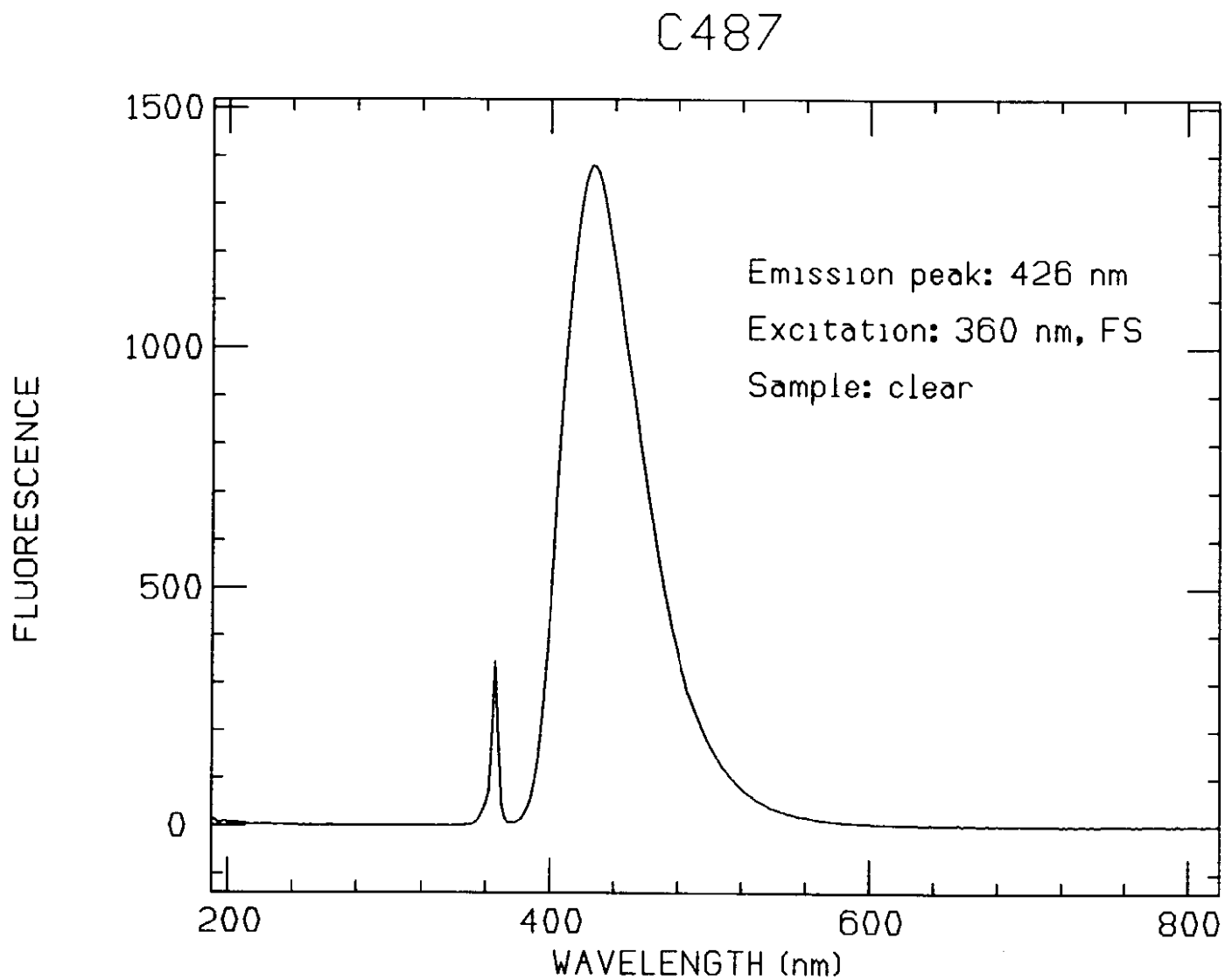

C480
Emission peak: 428 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

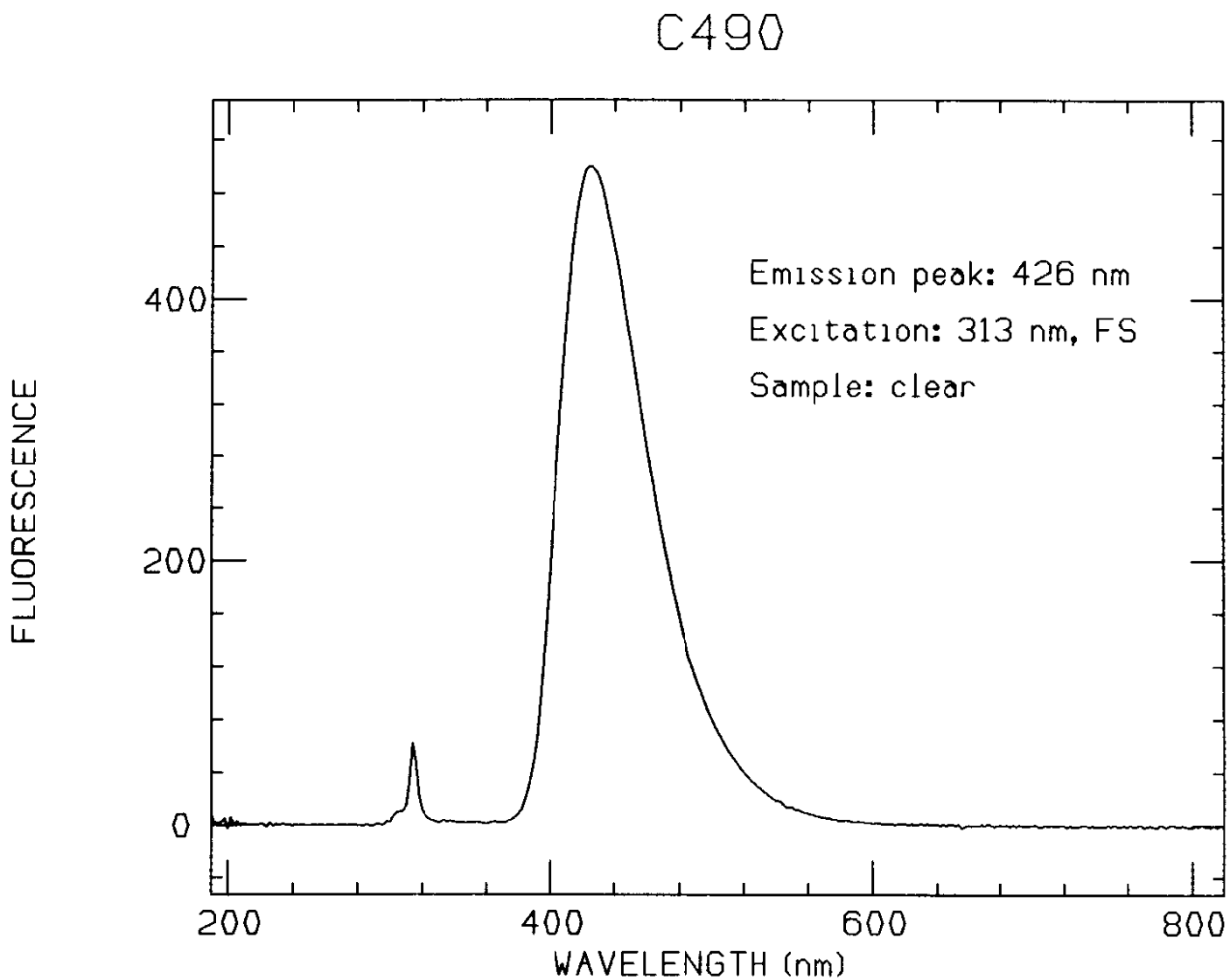

C480
Emission peak: 424 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

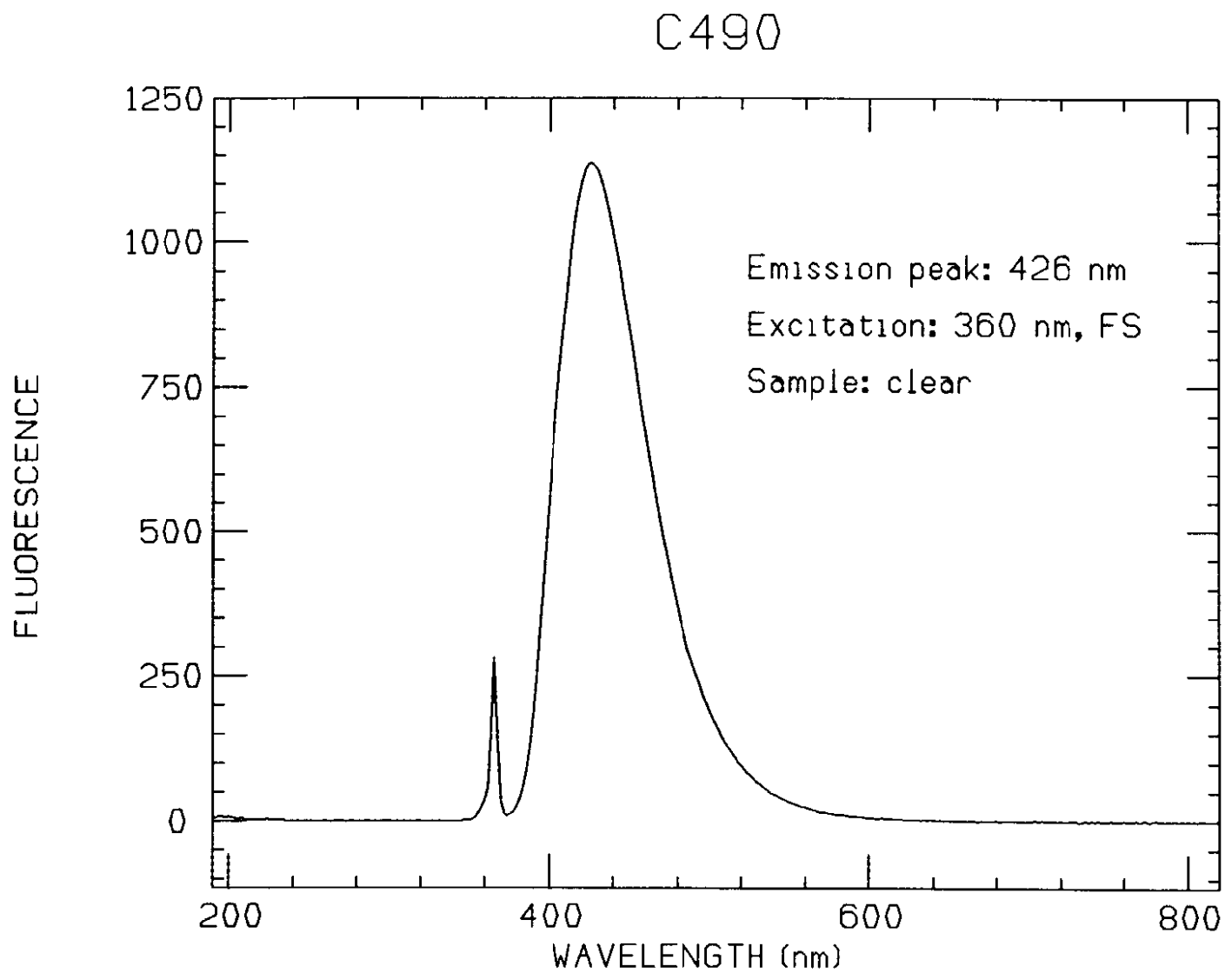

C485
Emission peak: 452 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

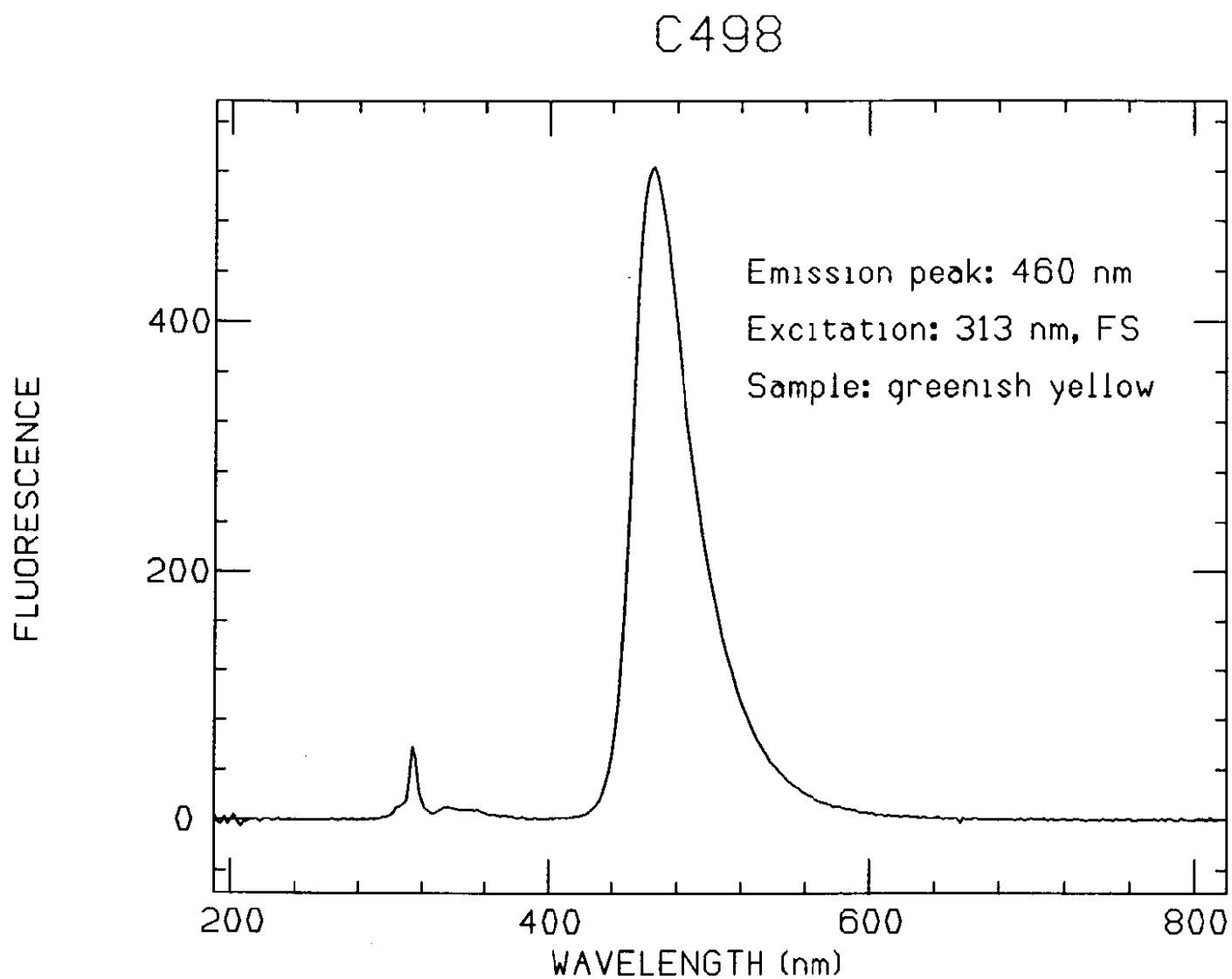

C485
Emission peak: 452 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

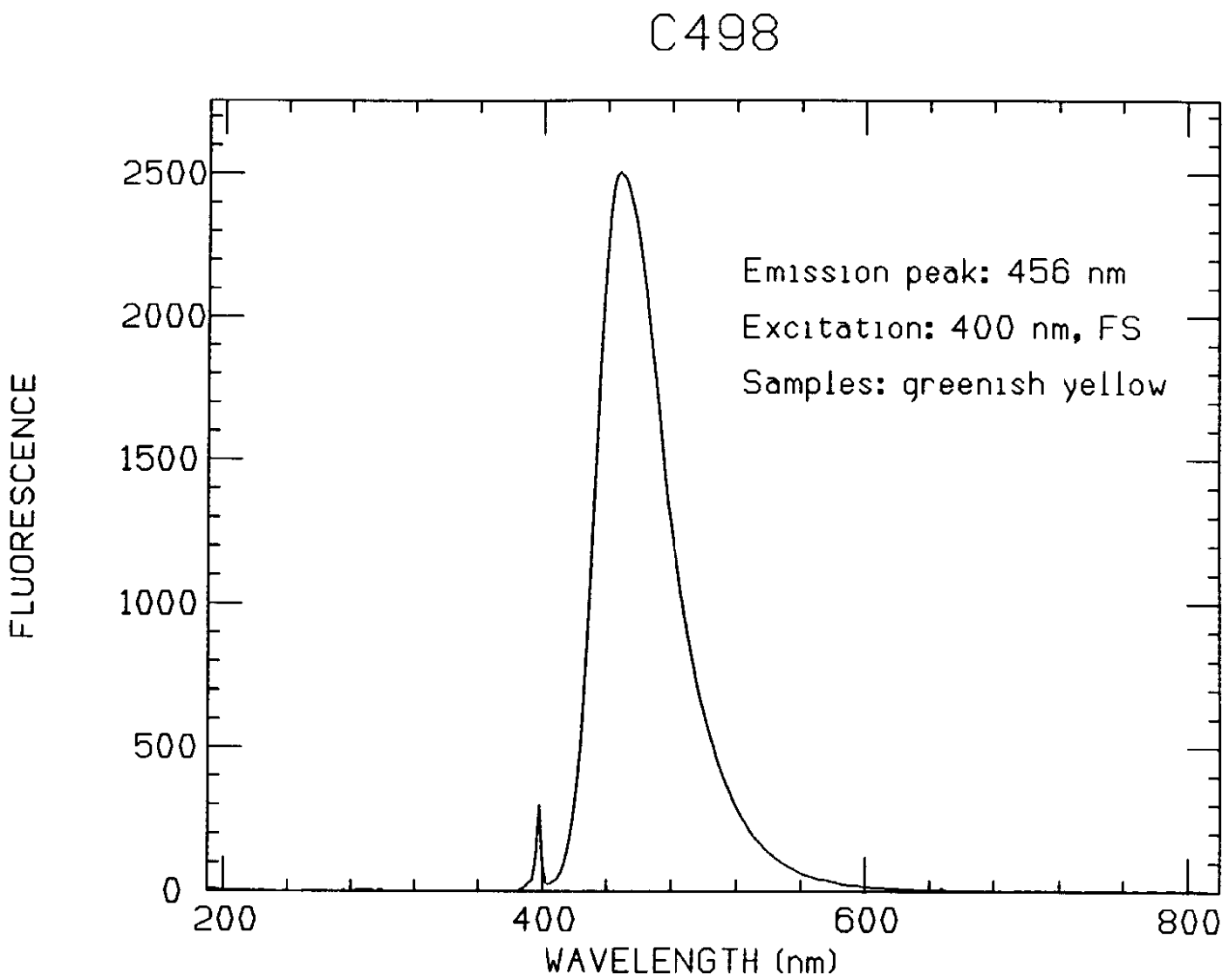

C487
Emission peak: 426 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
600
400
200
0
200
400
600
800
WAVELENGTH (nm)

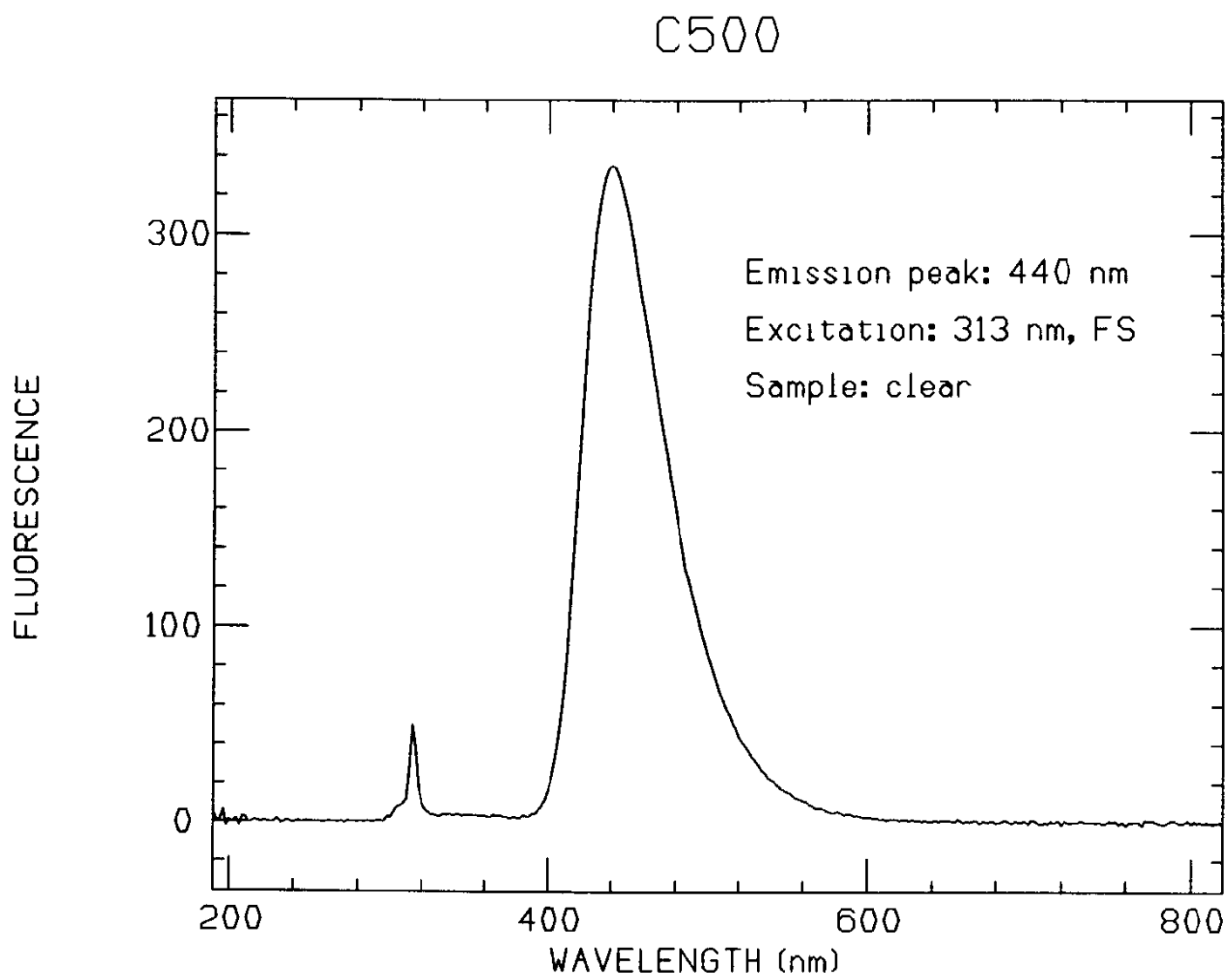

C487
Emission peak: 426 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

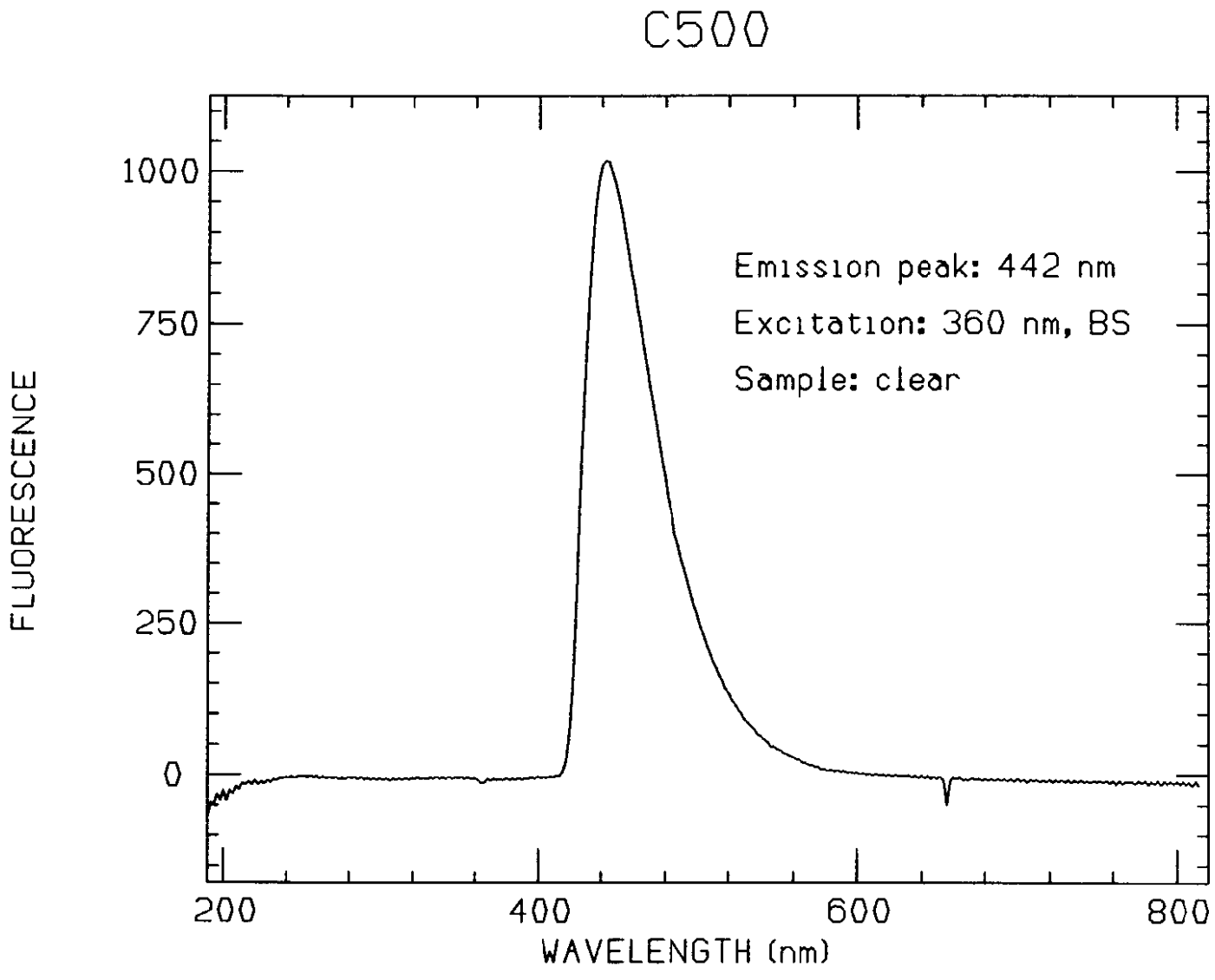

C490
Emission peak: 426 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
200
400
600
800
WAVELENGTH (nm)

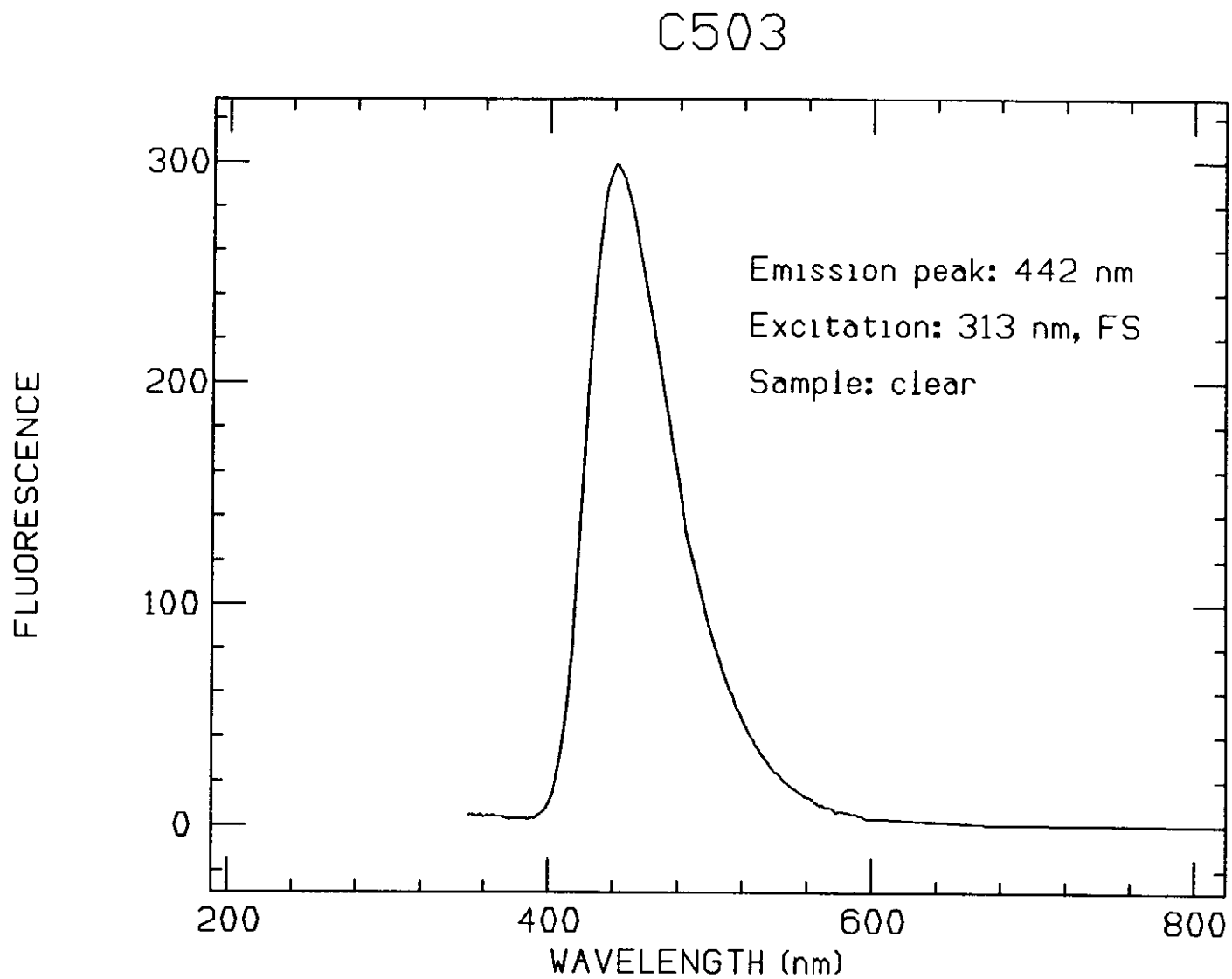

C490
Emission peak: 426 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1250
1000
750
500
250
0
200
400
600
800
WAVELENGTH (nm)

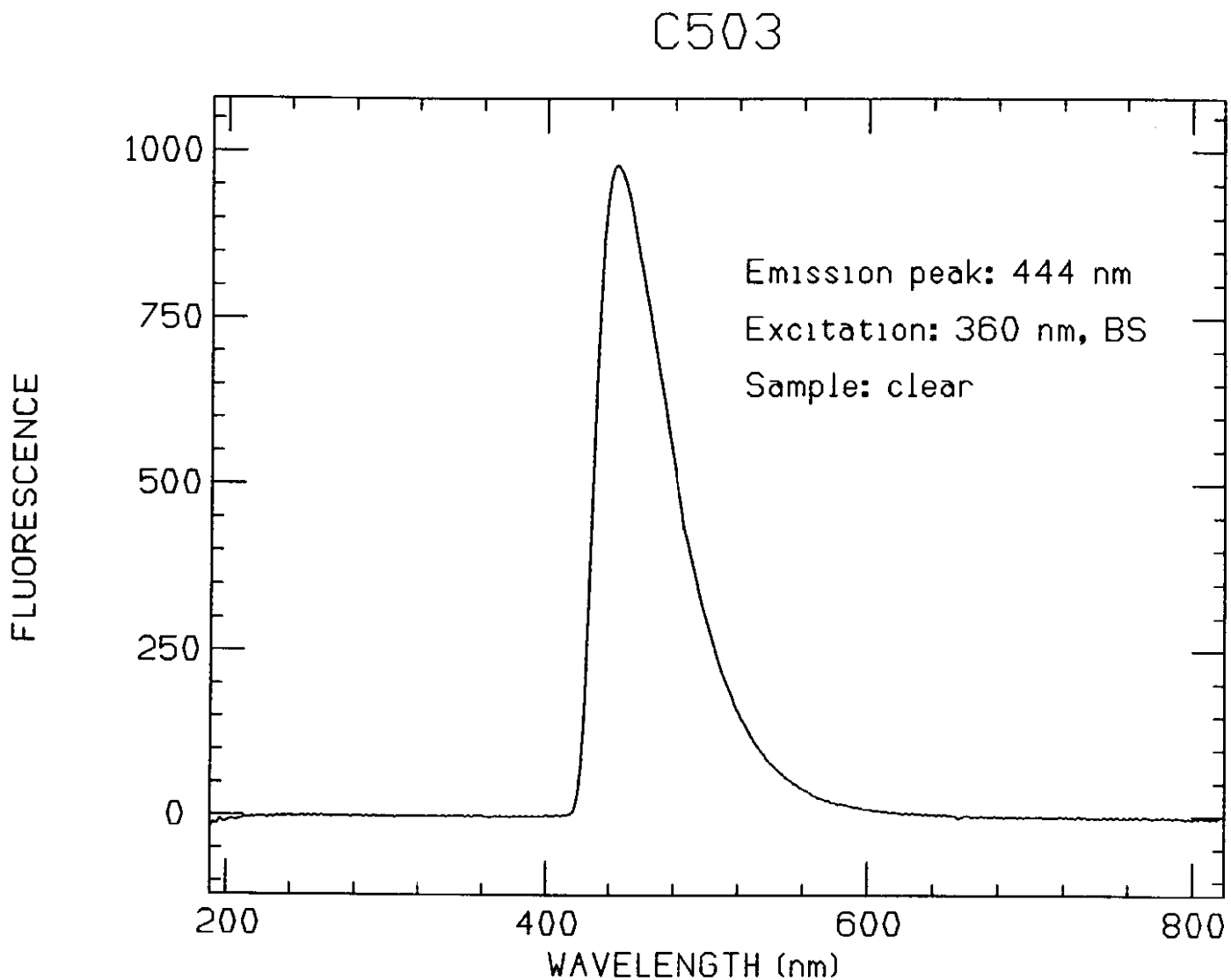

C498
Emission peak: 460 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
0
200
400
200
400
600
800
WAVELENGTH (nm)

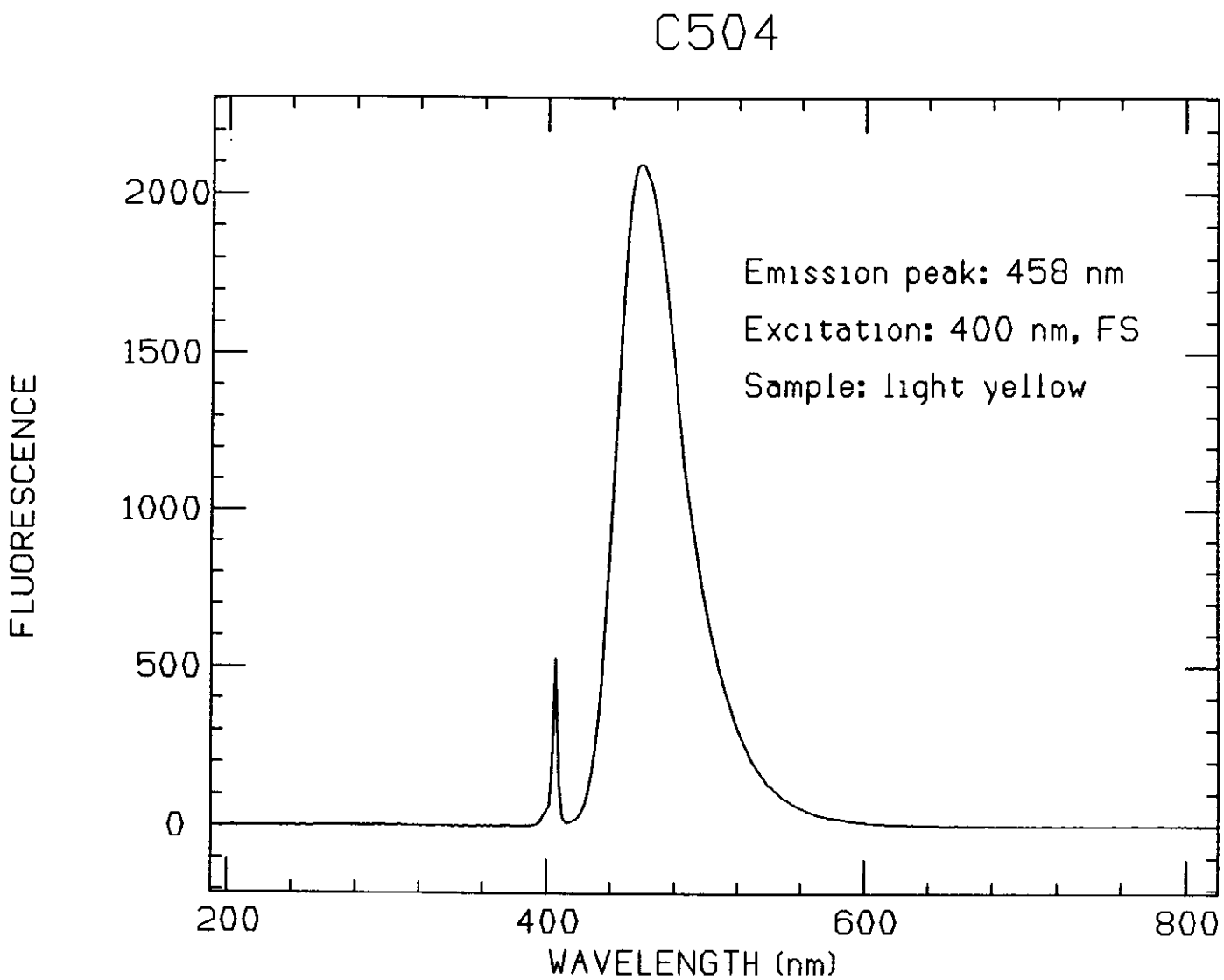

C498
Emission peak: 456 nm
Excitation: 400 nm, FS
Samples: greenish yellow
FLUORESCENCE
2500
2000
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

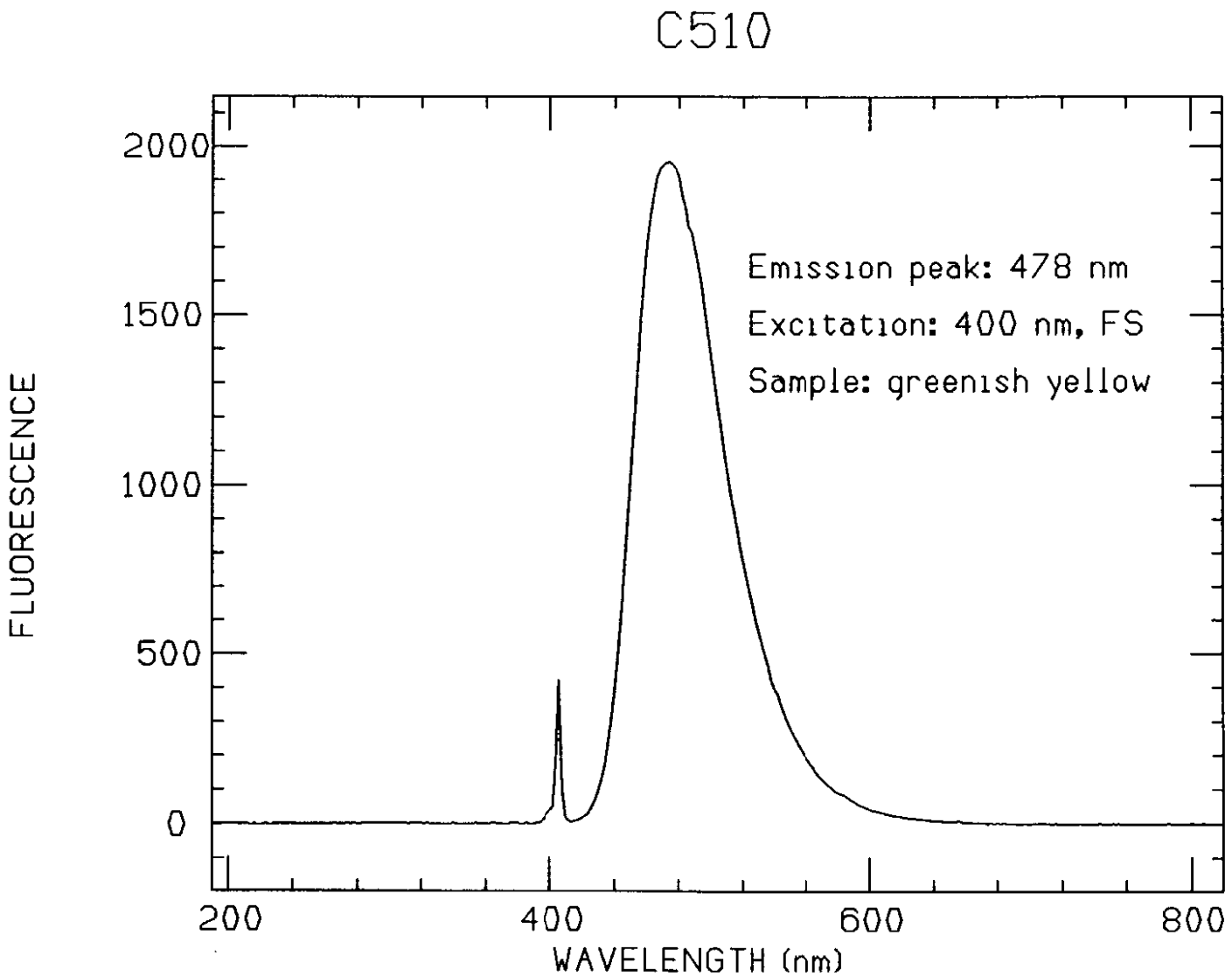

C500
Emission peak: 440 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

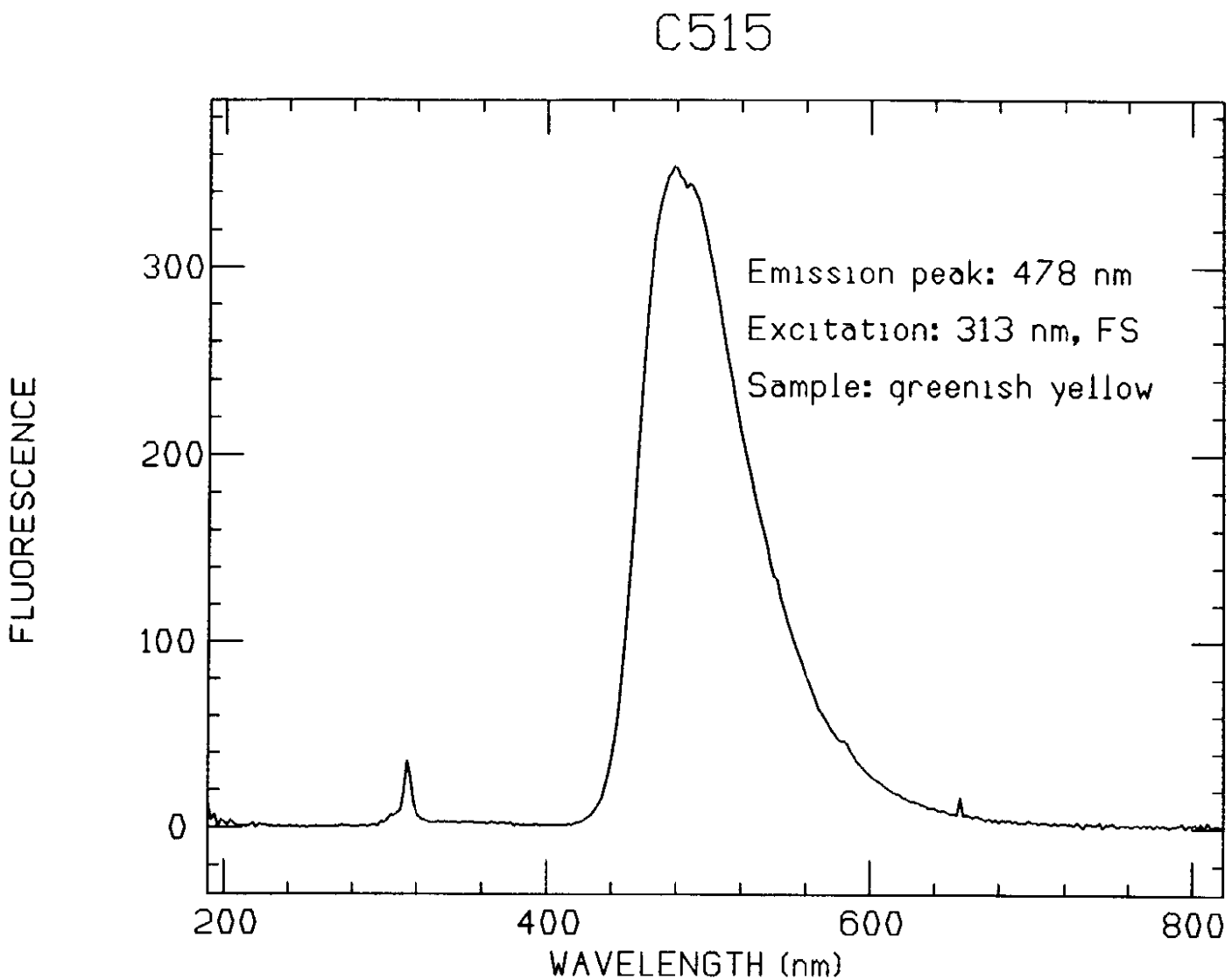

C500
Emission peak: 442 nm
Excitation: 360 nm, BS
Sample: clear
FLUORESCENCE
1000
750
500
250
0
200
400
600
800
WAVELENGTH (nm)

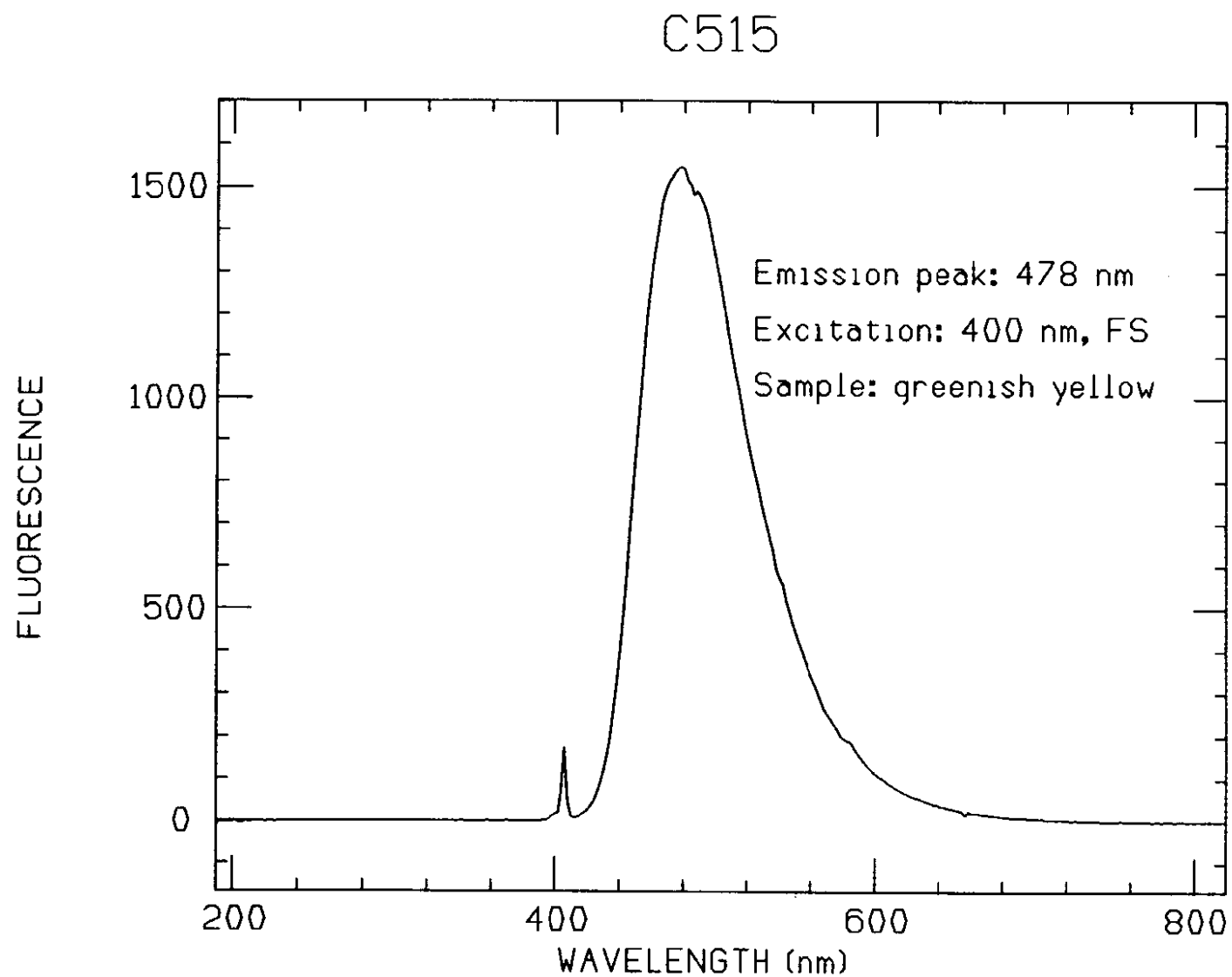

C503
Emission peak: 442 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

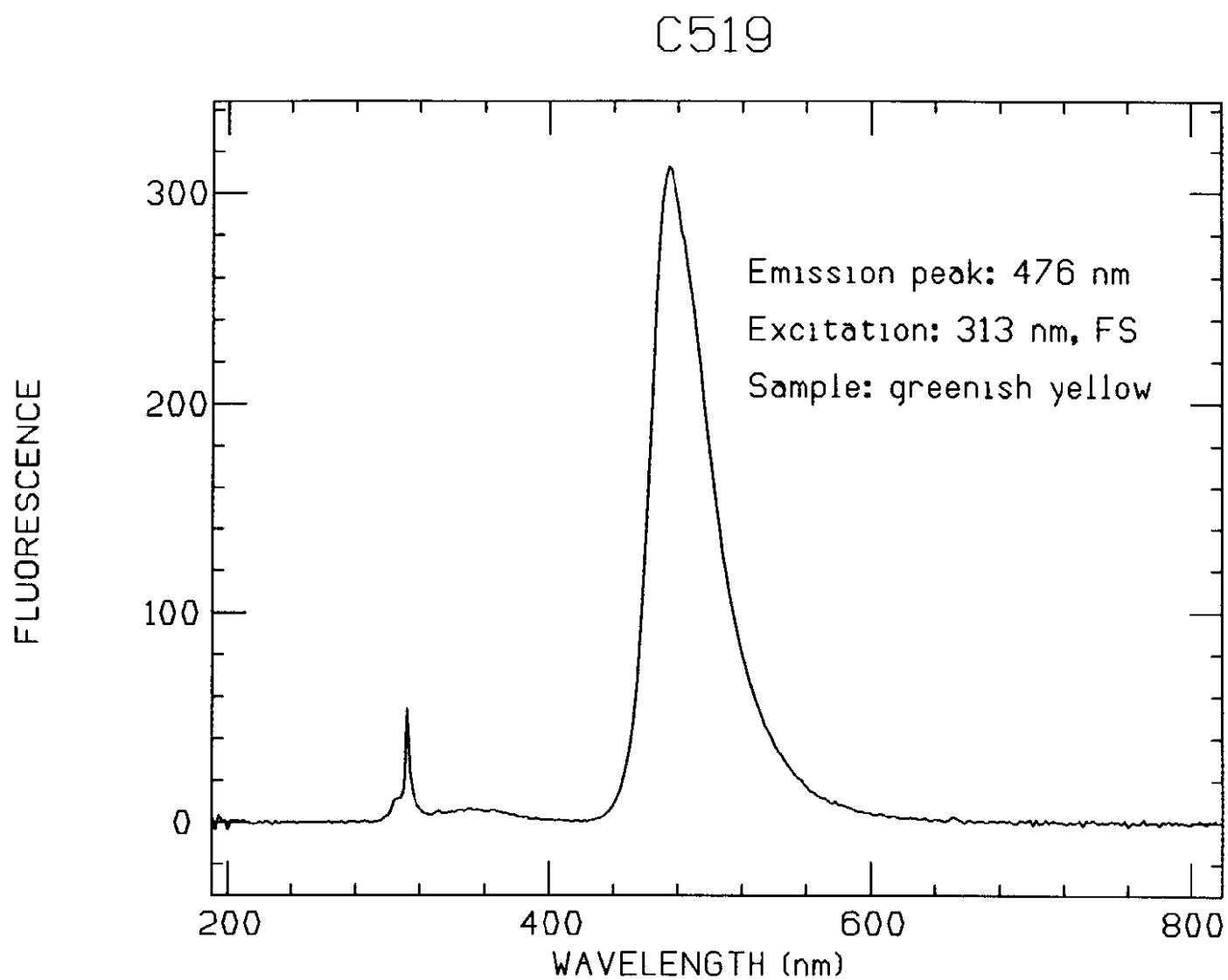

C503
Emission peak: 444 nm
Excitation: 360 nm, BS
Sample: clear
FLUORESCENCE
1000
750
500
250
0
200
400
600
800
WAVELENGTH (nm)

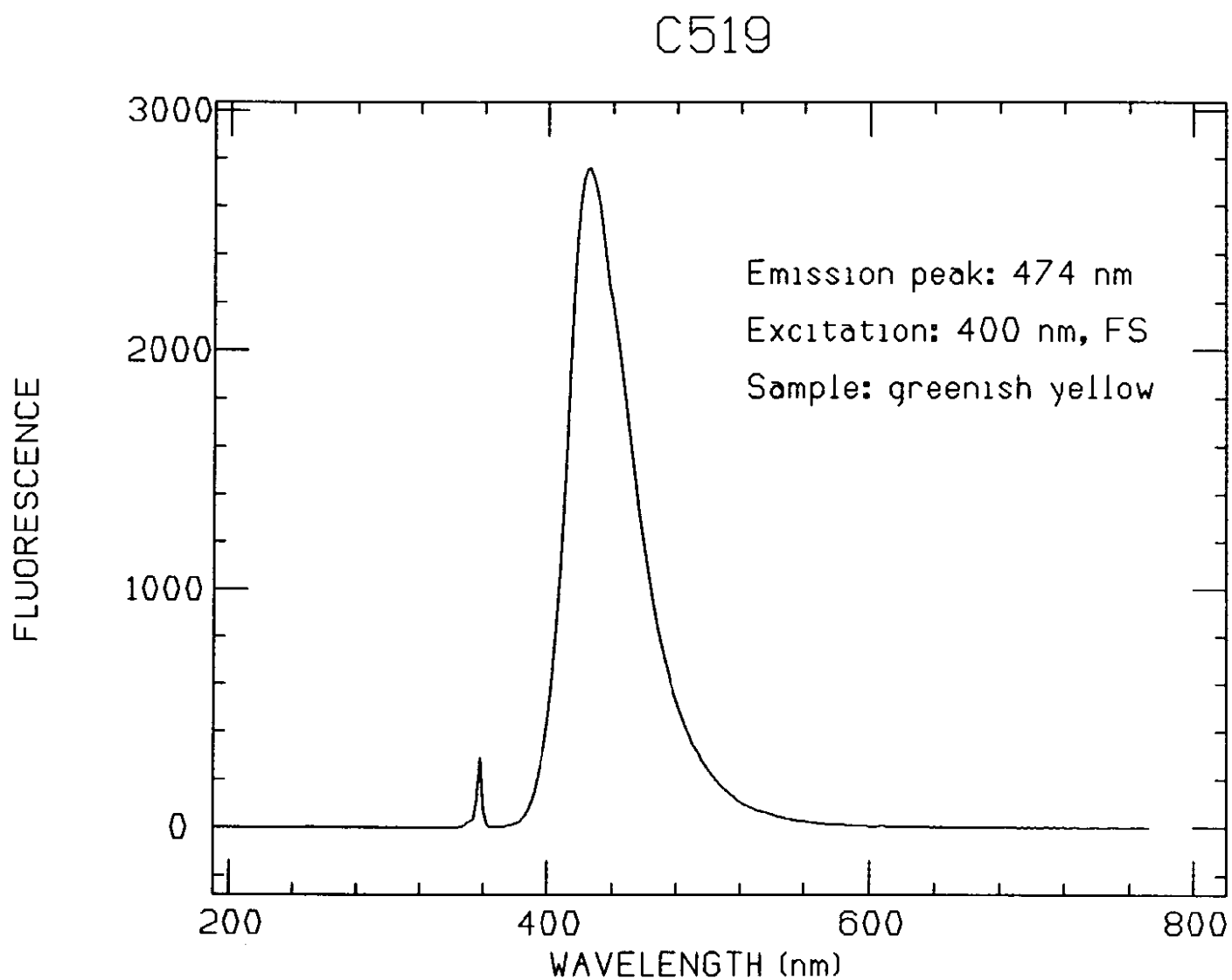

C504
Emission peak: 458 nm
Excitation: 400 nm, FS
Sample: light yellow
FLUORESCENCE
2000
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

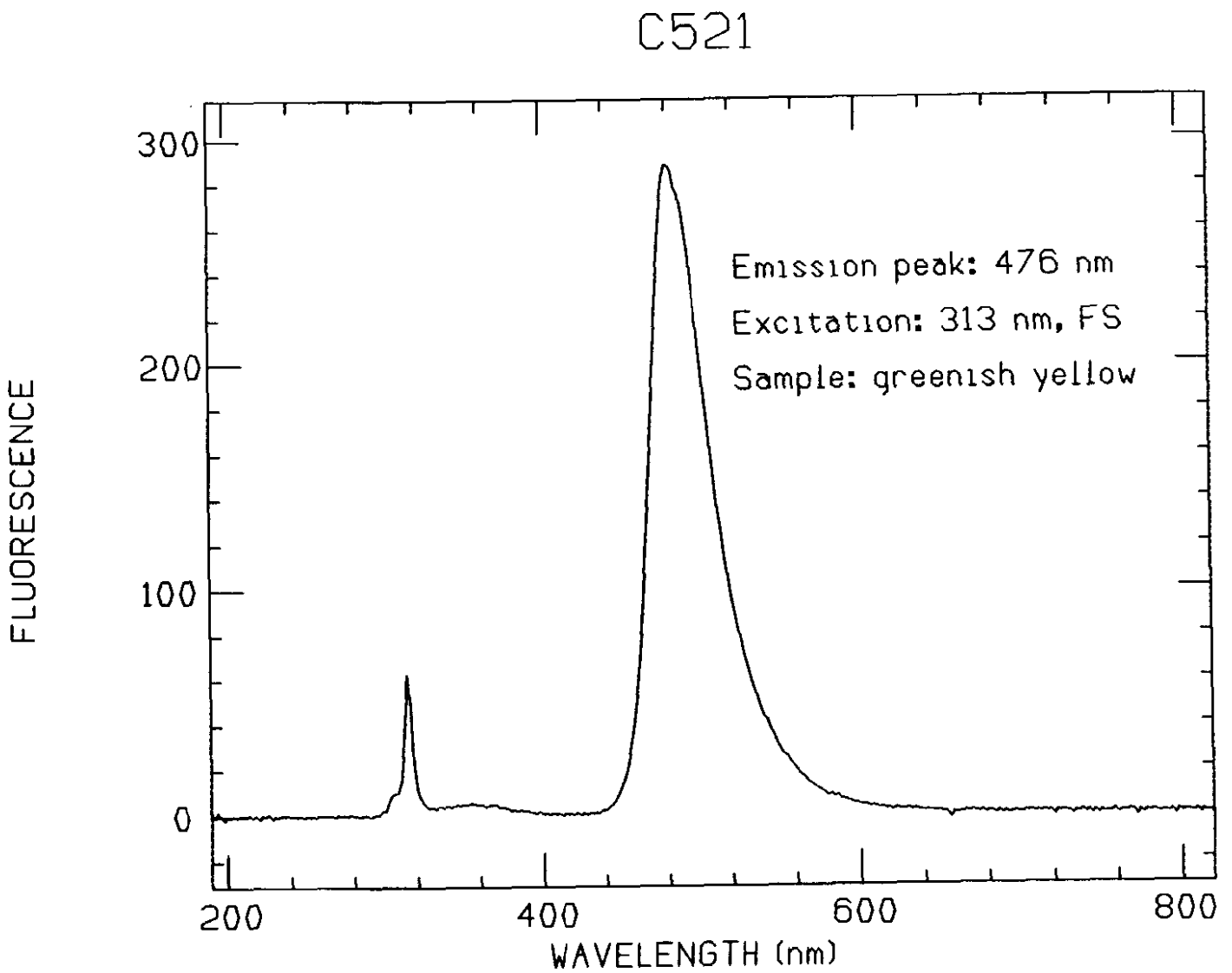

C510
Emission peak: 478 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
2000
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

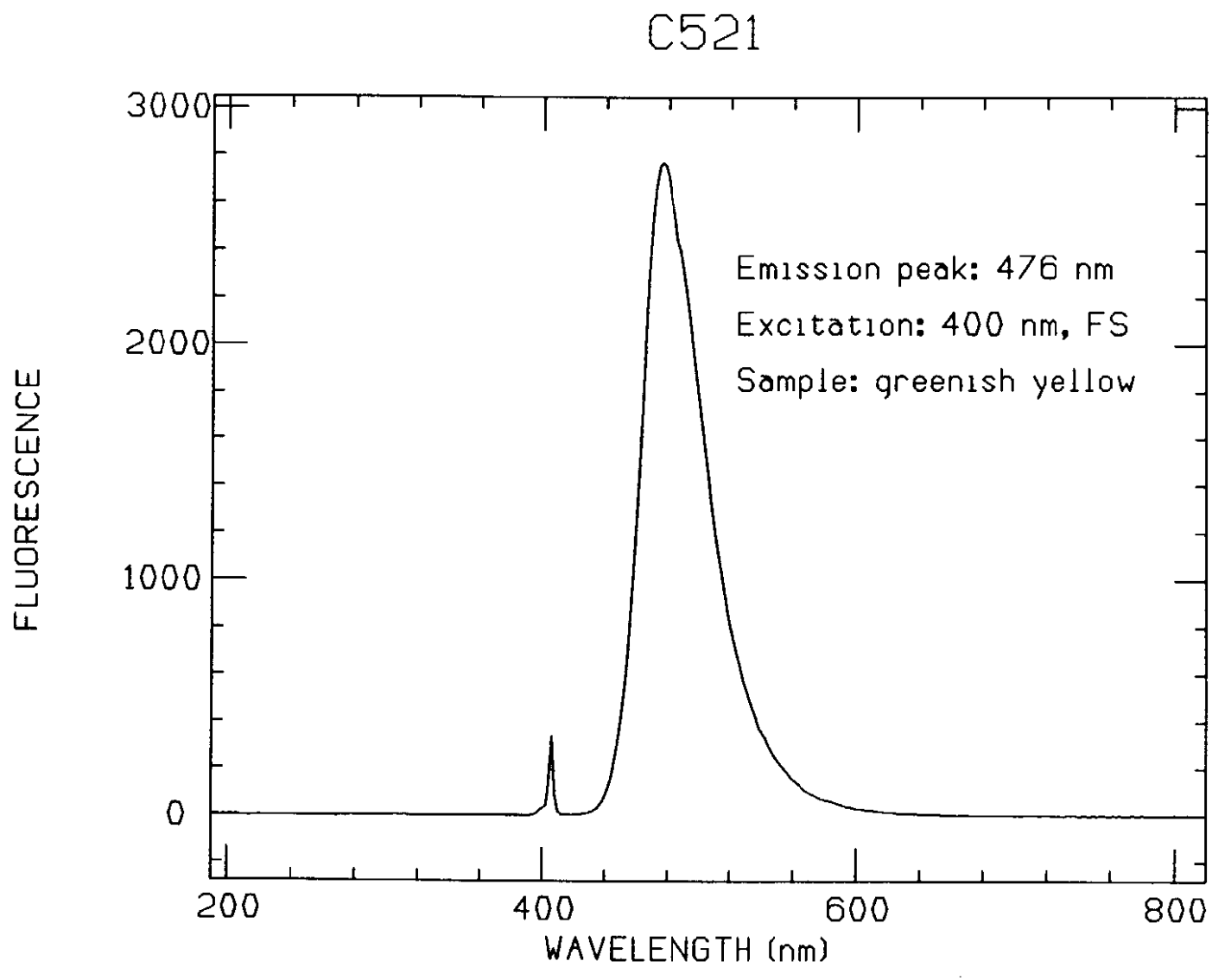

C515
Emission peak: 478 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

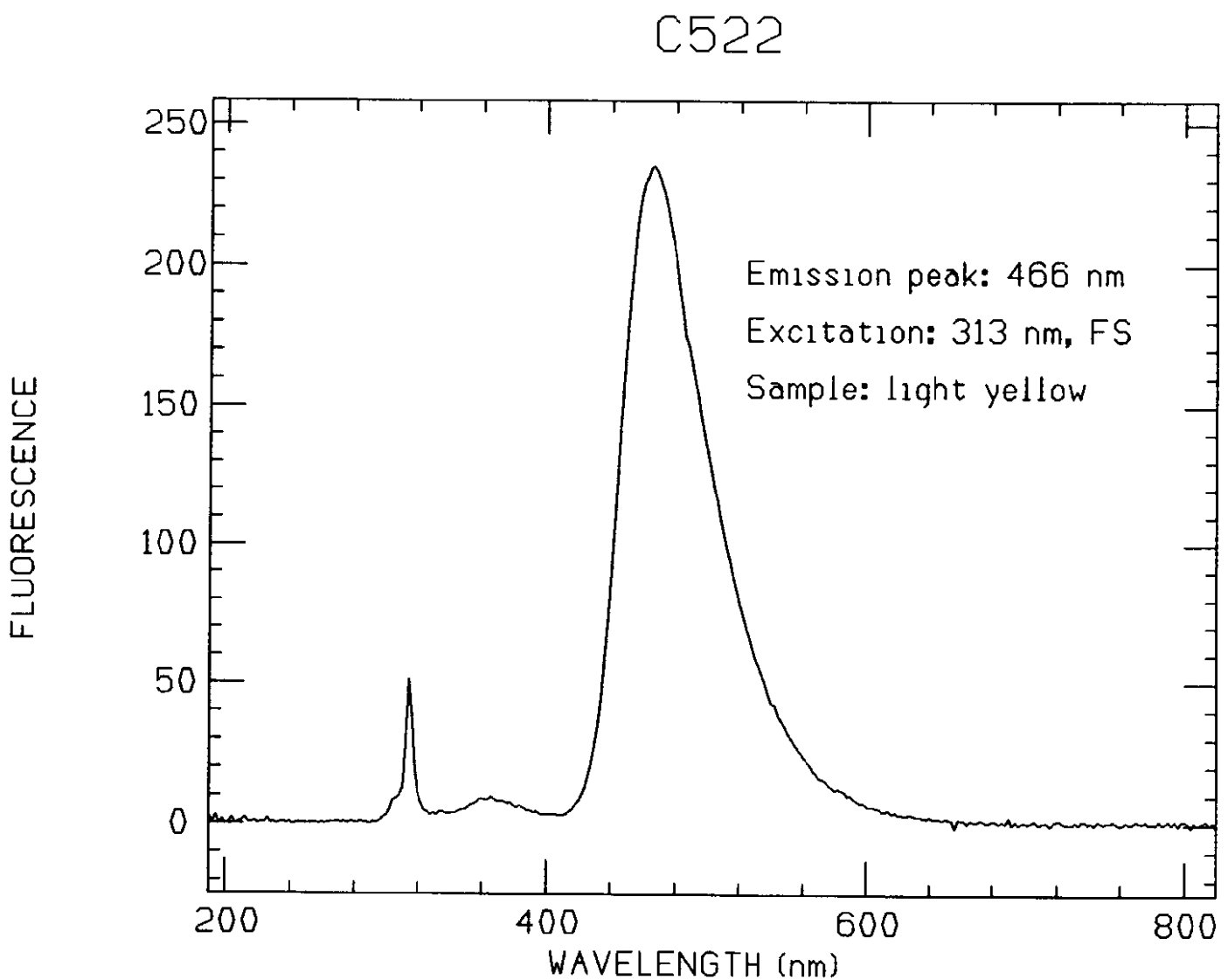

C515
Emission peak: 478 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

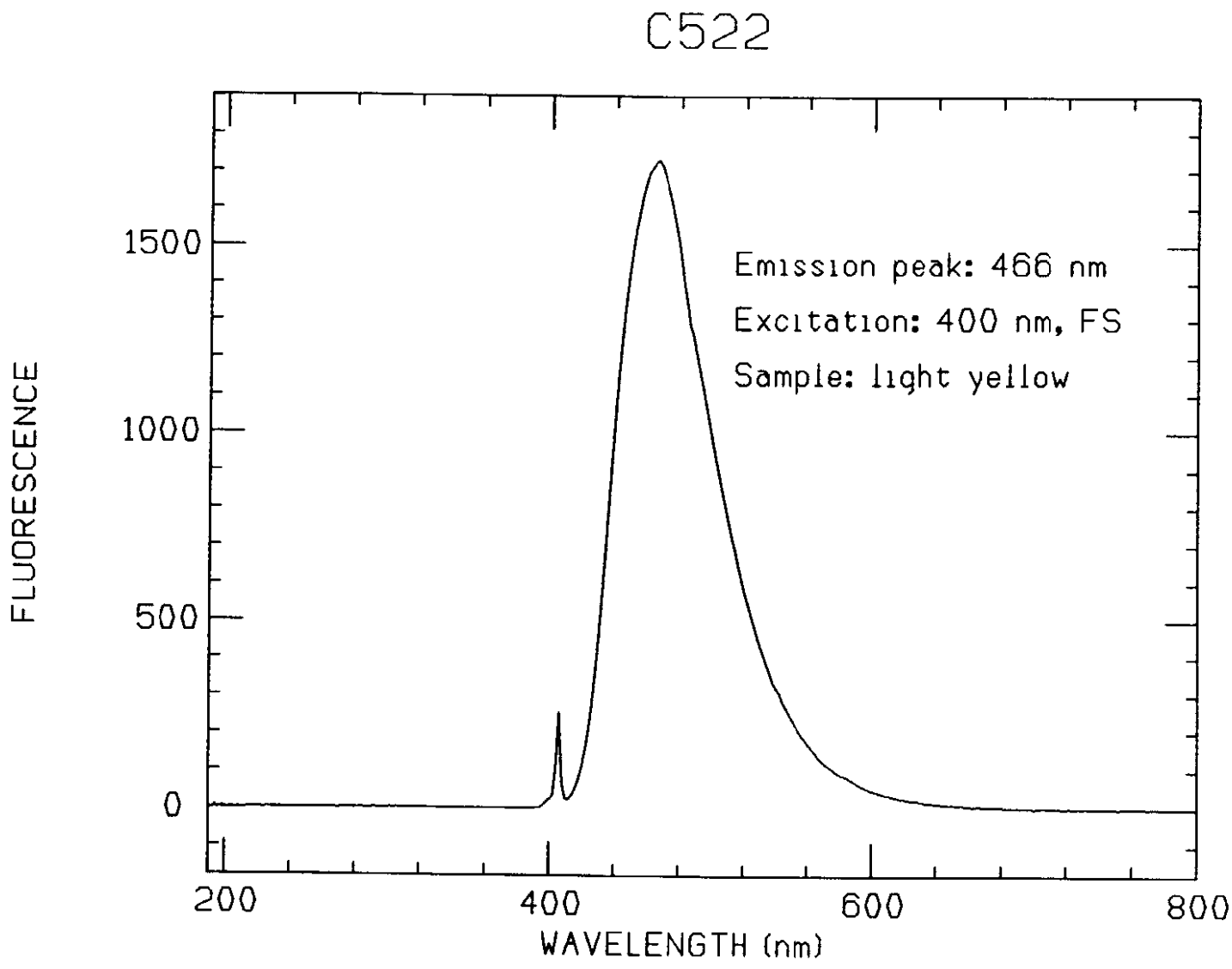

C519
Emission peak: 476 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

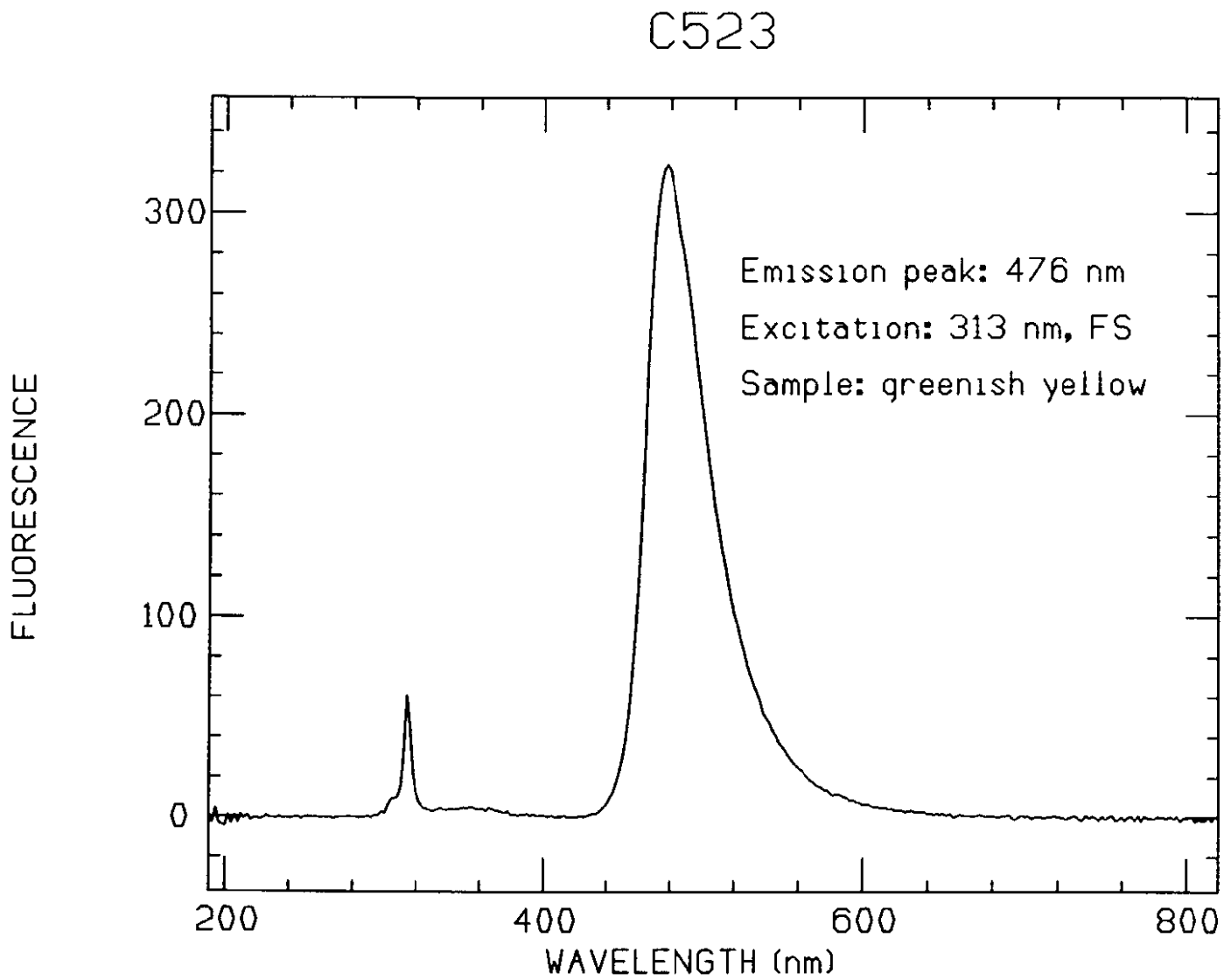

C519
Emission peak: 474 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
3000
2000
1000
0
200
400
600
800
WAVELENGTH (nm)

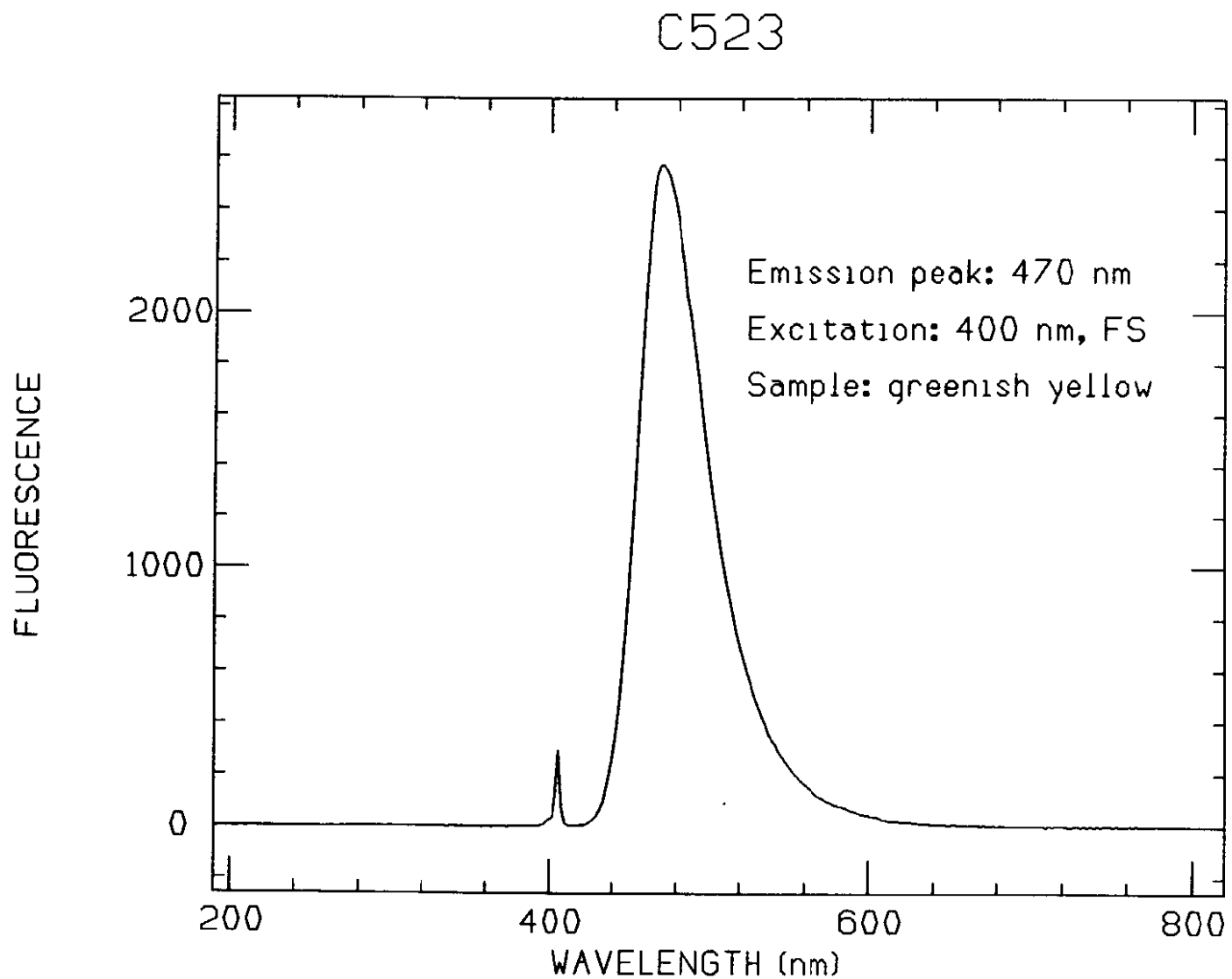

C521
Emission peak: 476 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

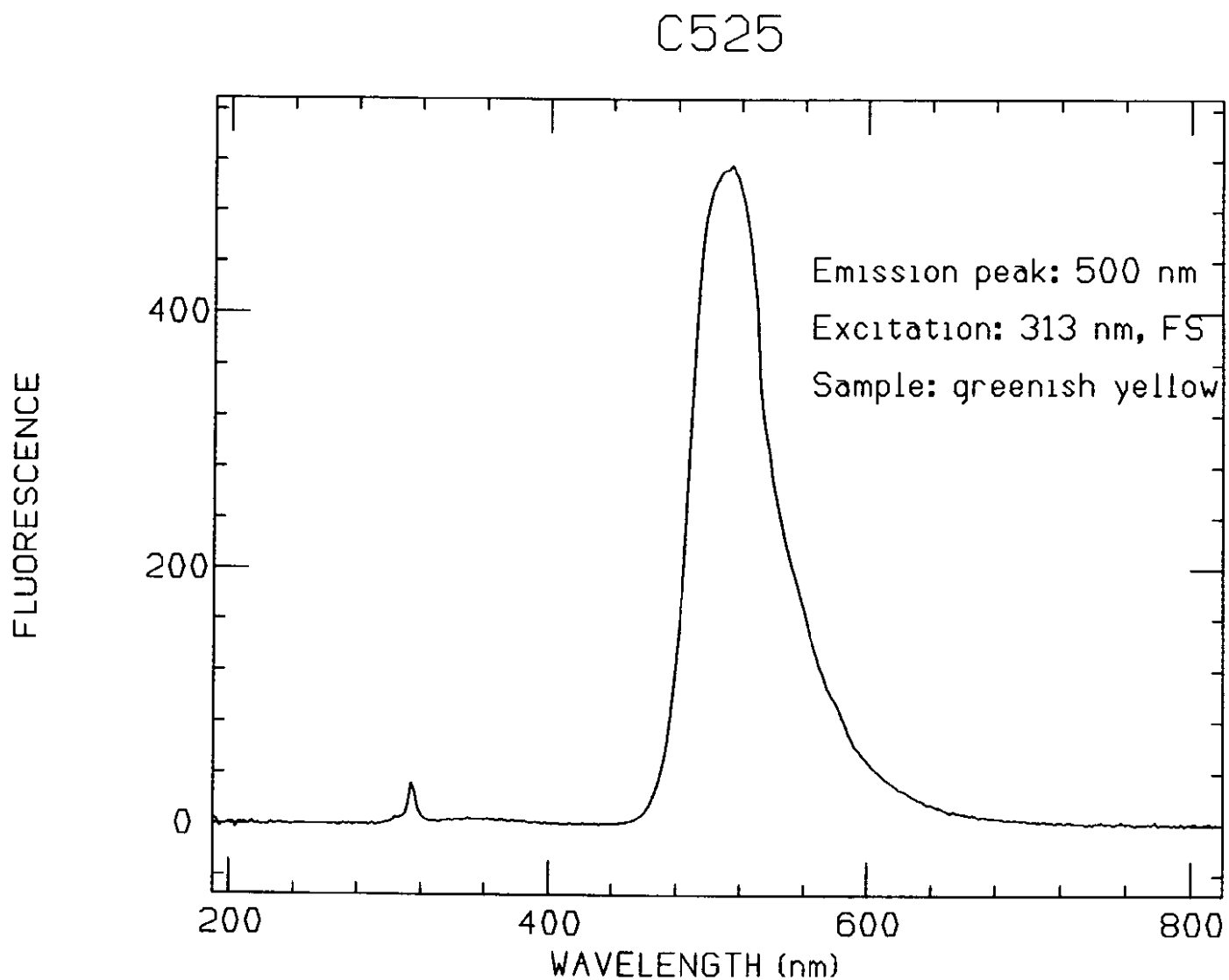

C521
Emission peak: 476 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
3000
2000
1000
0
200
400
600
800
WAVELENGTH (nm)

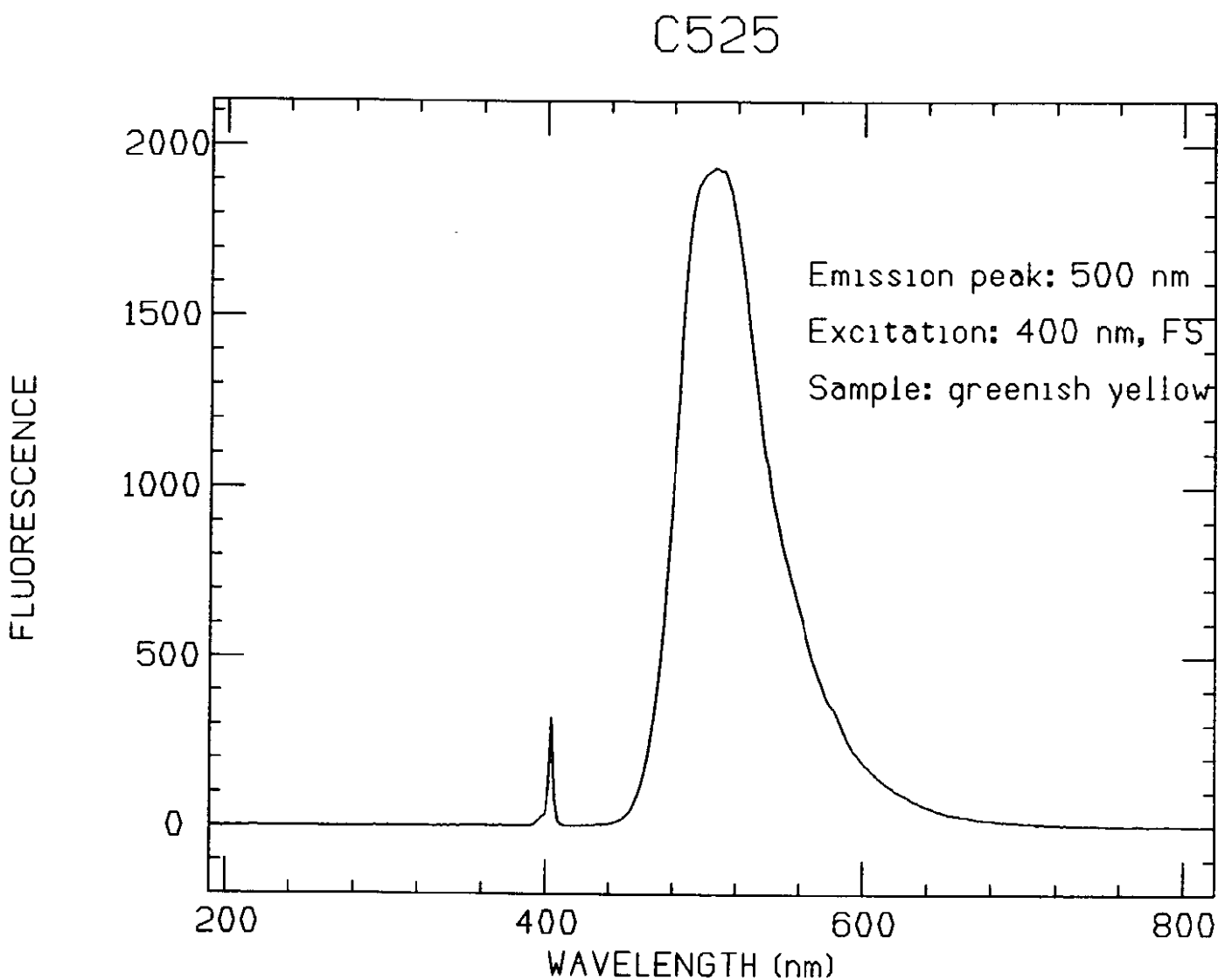

C522
Emission peak: 466 nm
Excitation: 313 nm, FS
Sample: light yellow
FLUORESCENCE
250
200
150
100
50
0
200
400
600
800
WAVELENGTH (nm)

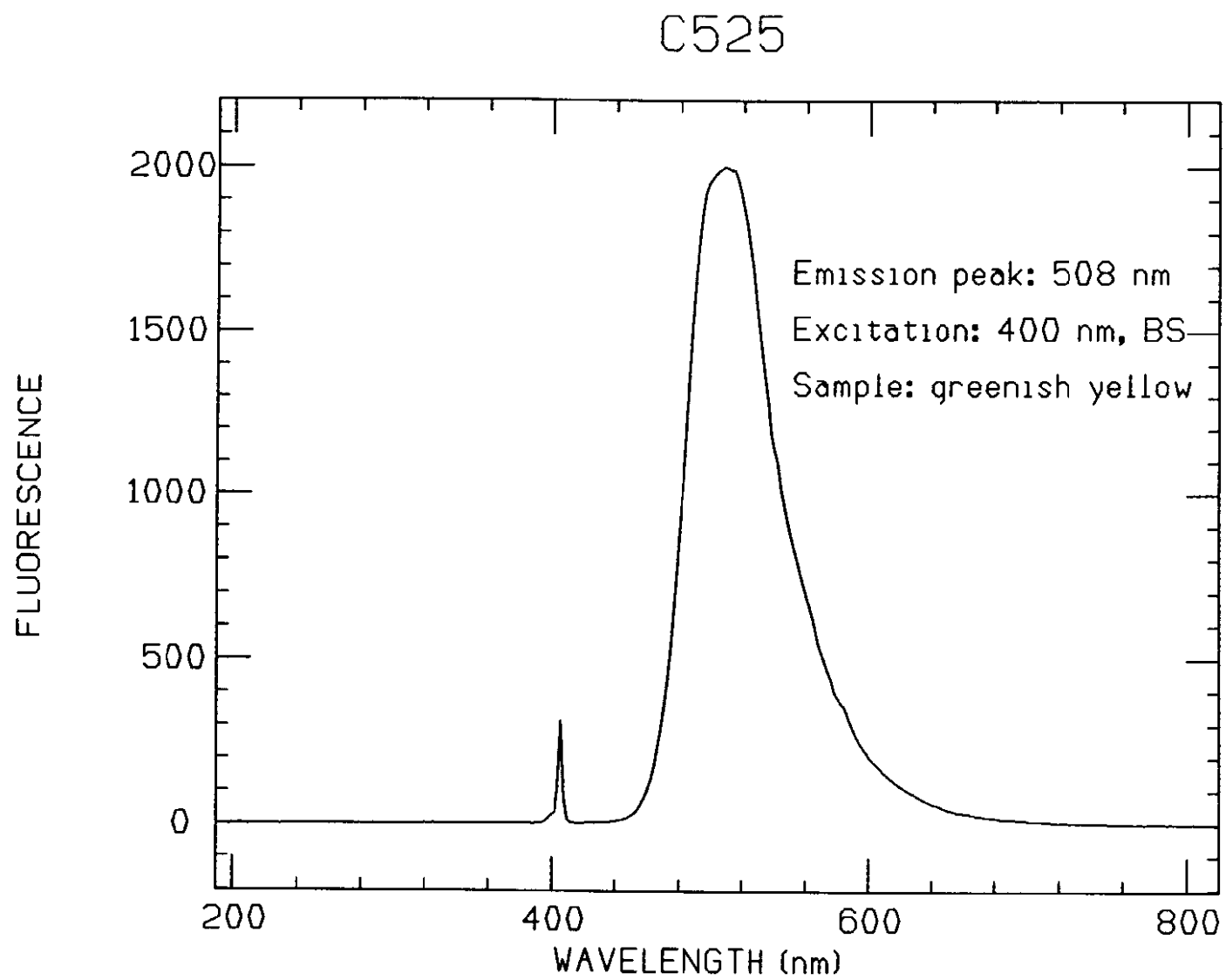

C522
Emission peak: 466 nm
Excitation: 400 nm, FS
Sample: light yellow
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

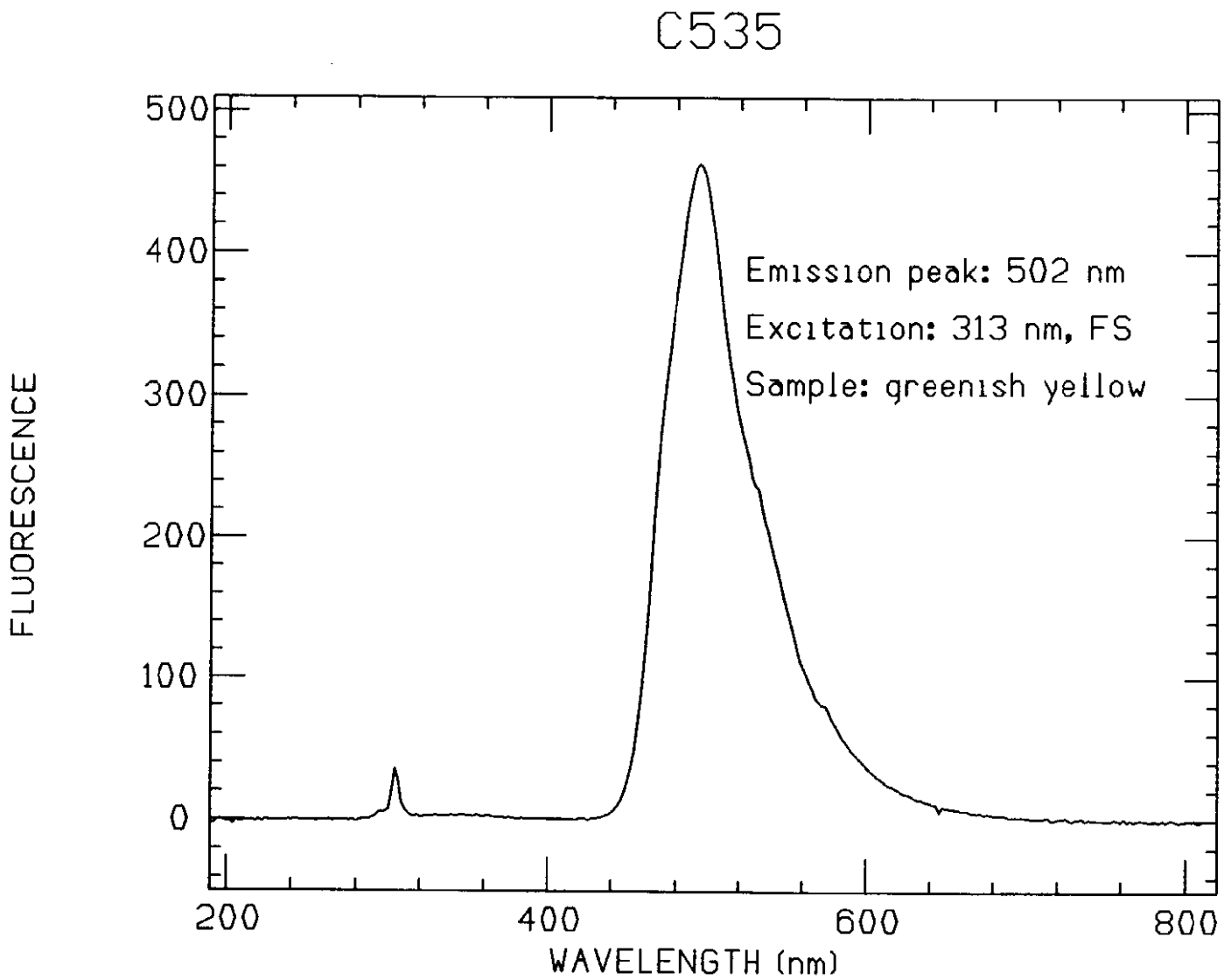

C523
Emission peak: 476 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

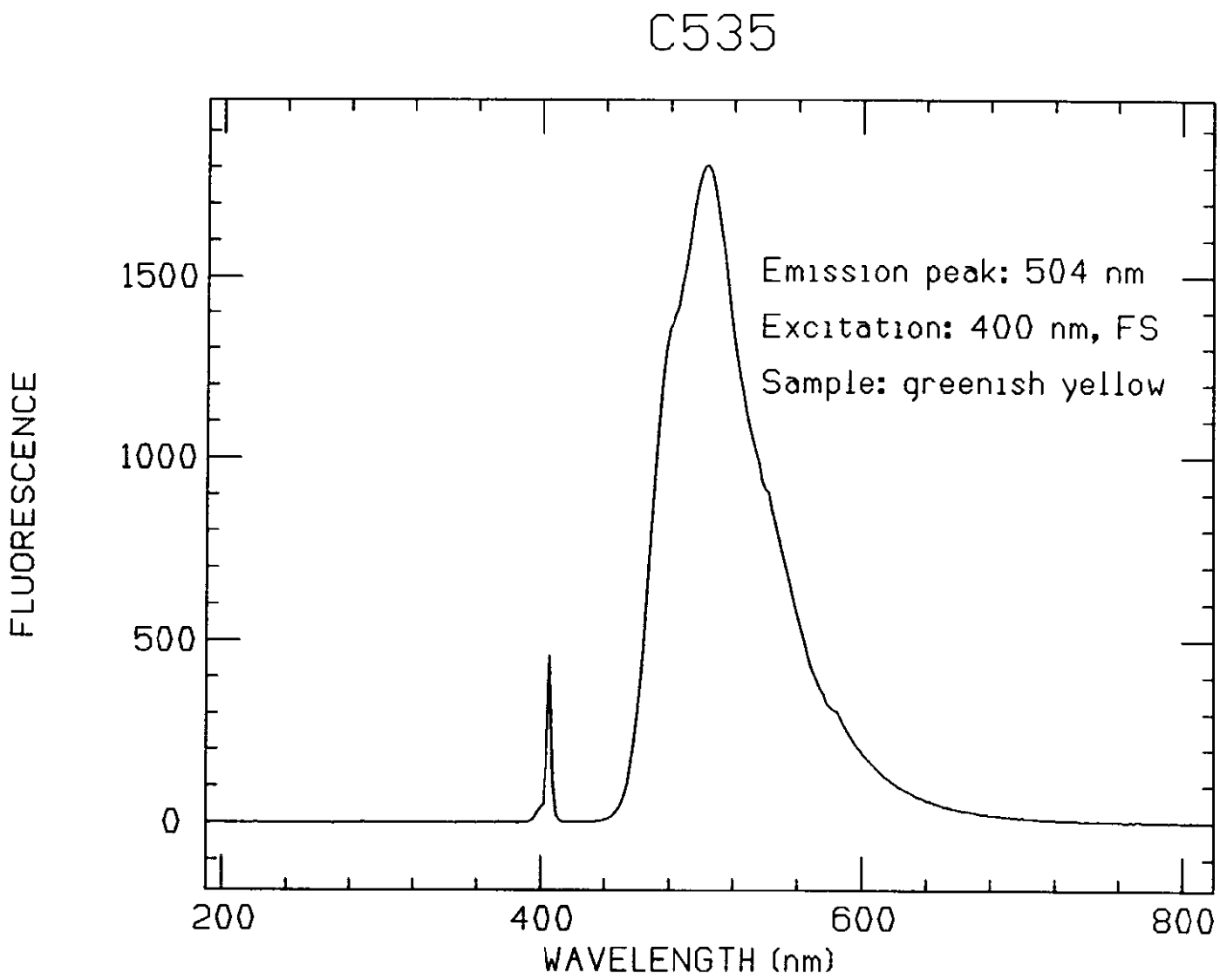

C523
Emission peak: 470 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
2000
1000
0
200
400
600
800
WAVELENGTH (nm)

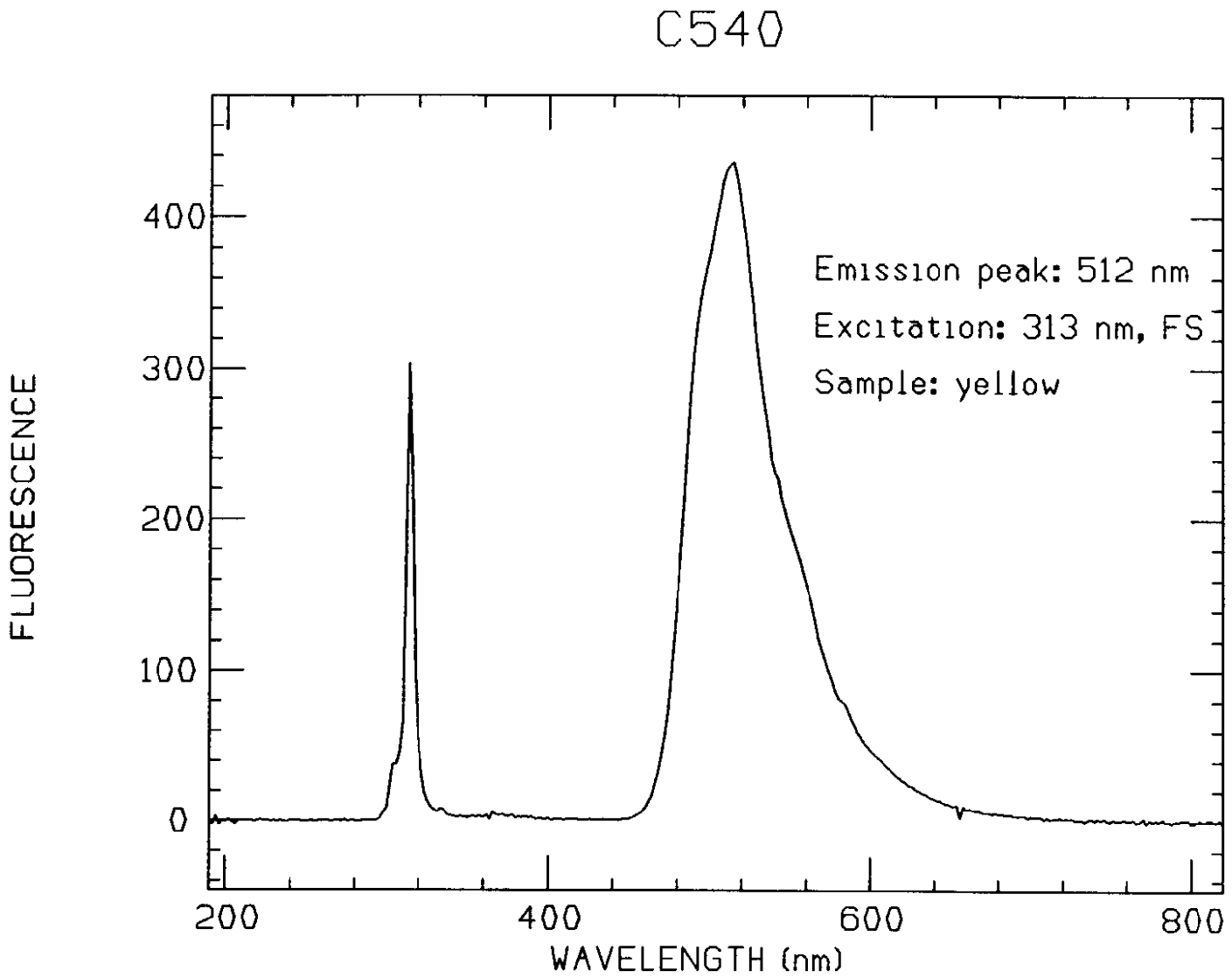

C525
Emission peak: 500 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
0
200
400
200
400
600
800
WAVELENGTH (nm)

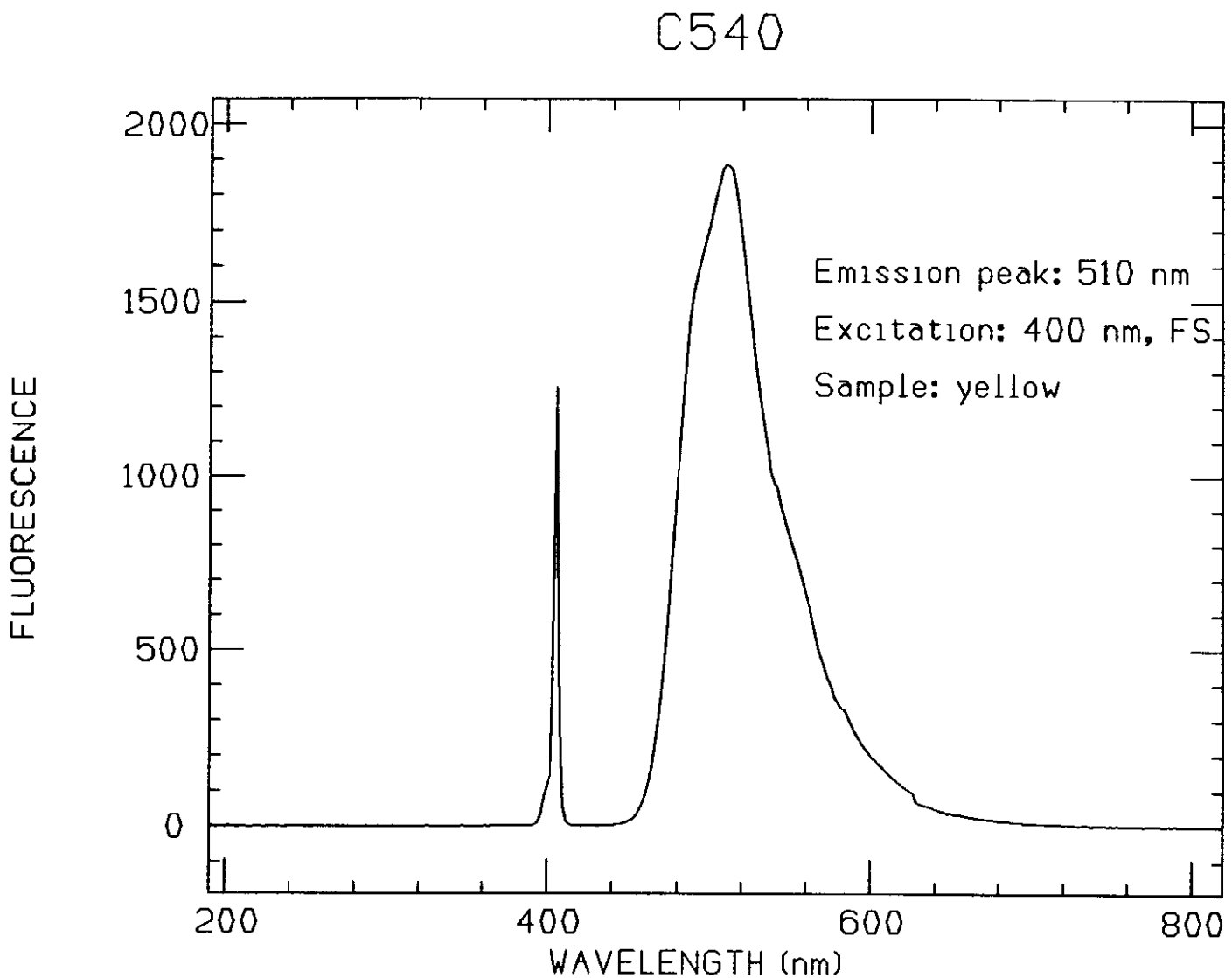

C525
Emission peak: 500 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
2000
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

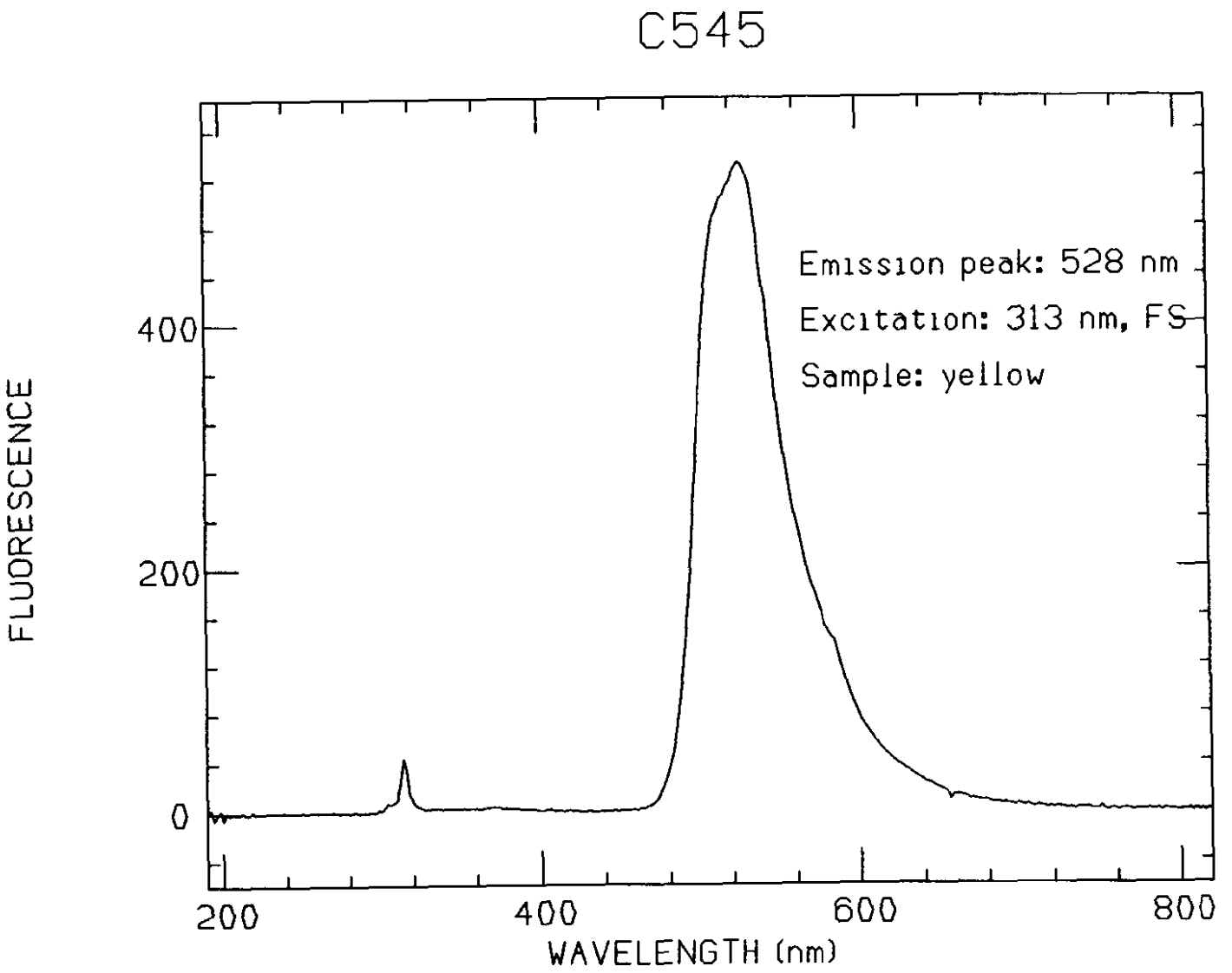

C525
Emission peak: 508 nm
Excitation: 400 nm, BS
Sample: greenish yellow
FLUORESCENCE
2000
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

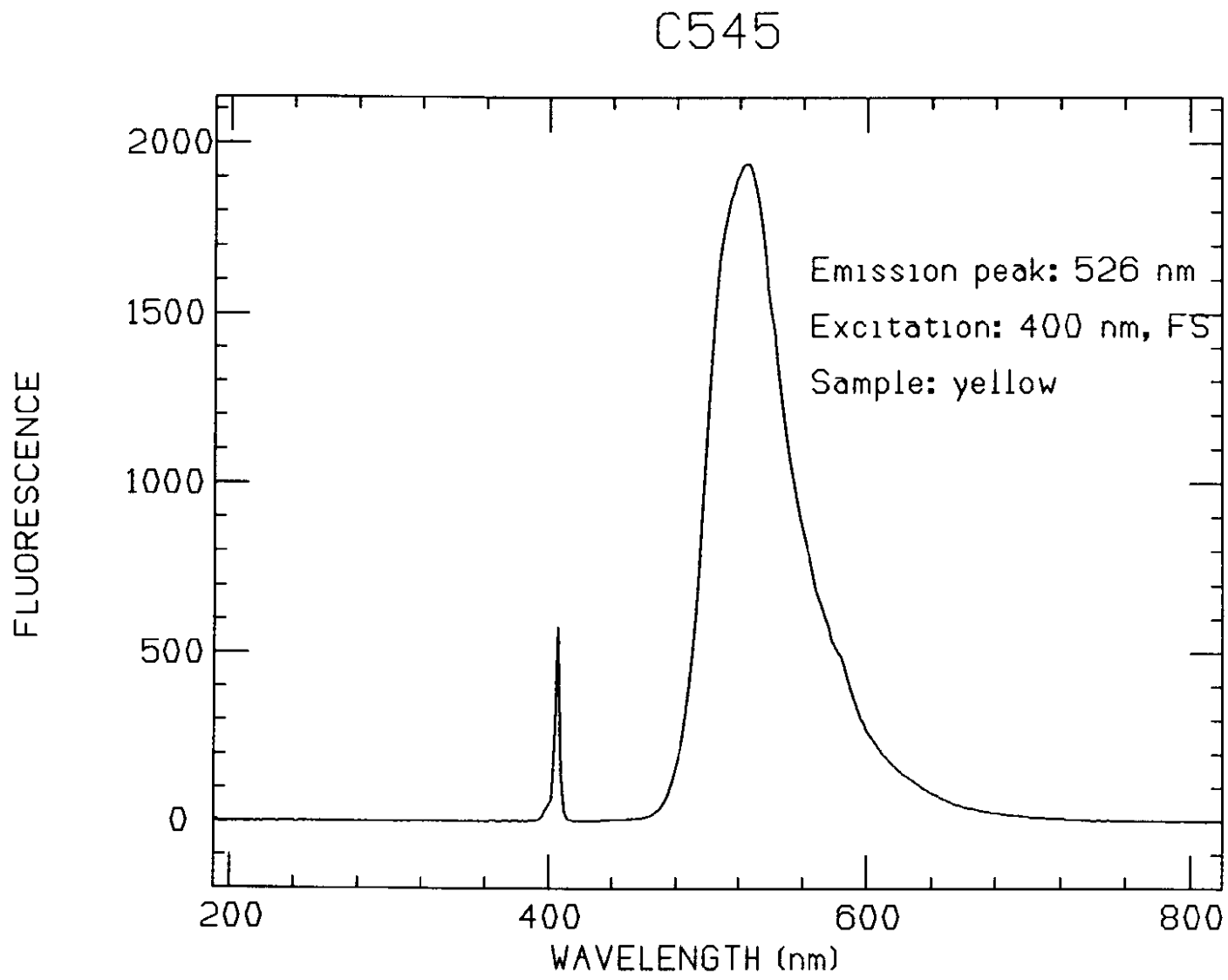

C535
Emission peak: 502 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
500
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

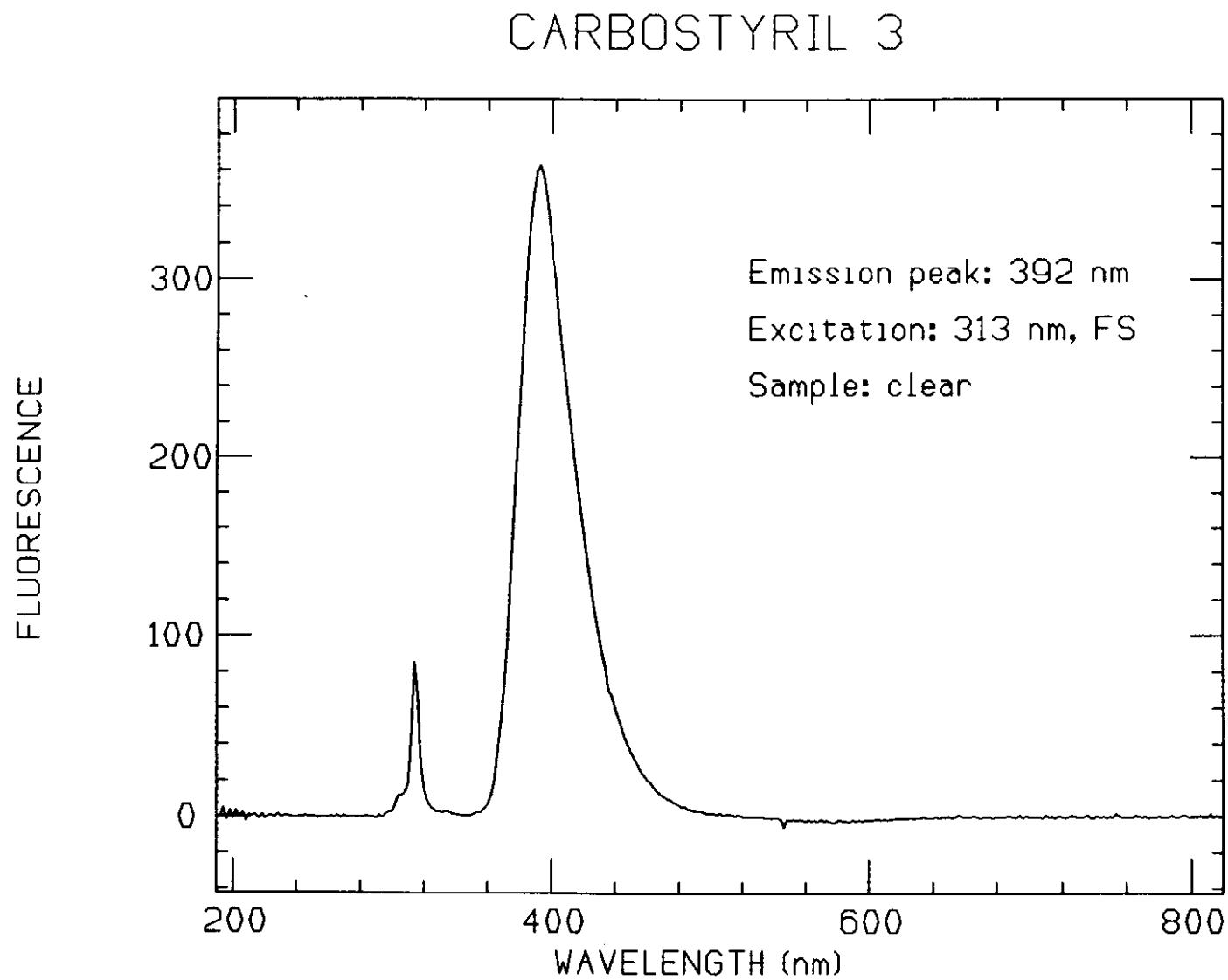

C535
Emission peak: 504 nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

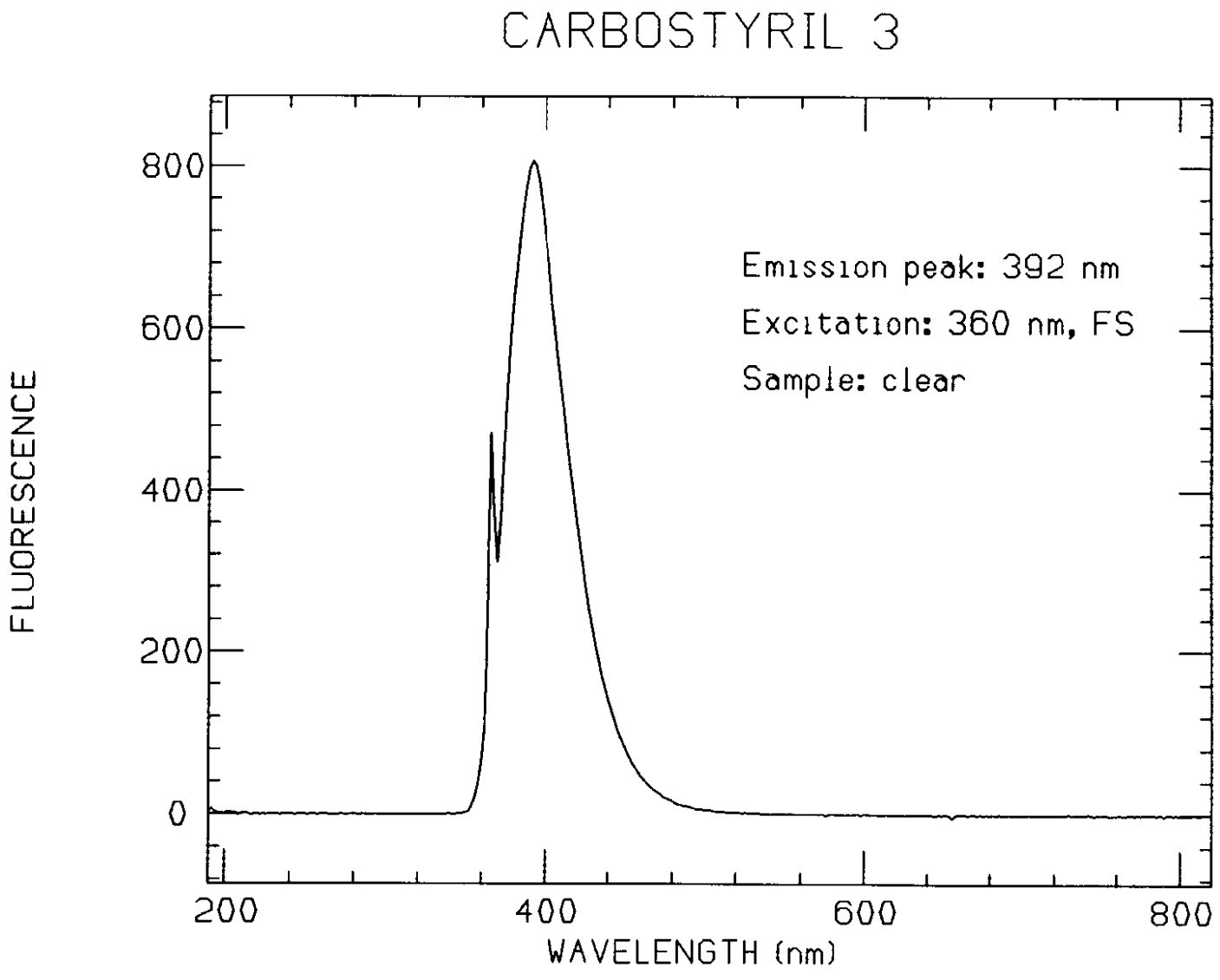

C540
Emission peak: 512 nm
Excitation: 313 nm, FS
Sample: yellow
FLUORESCENCE
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

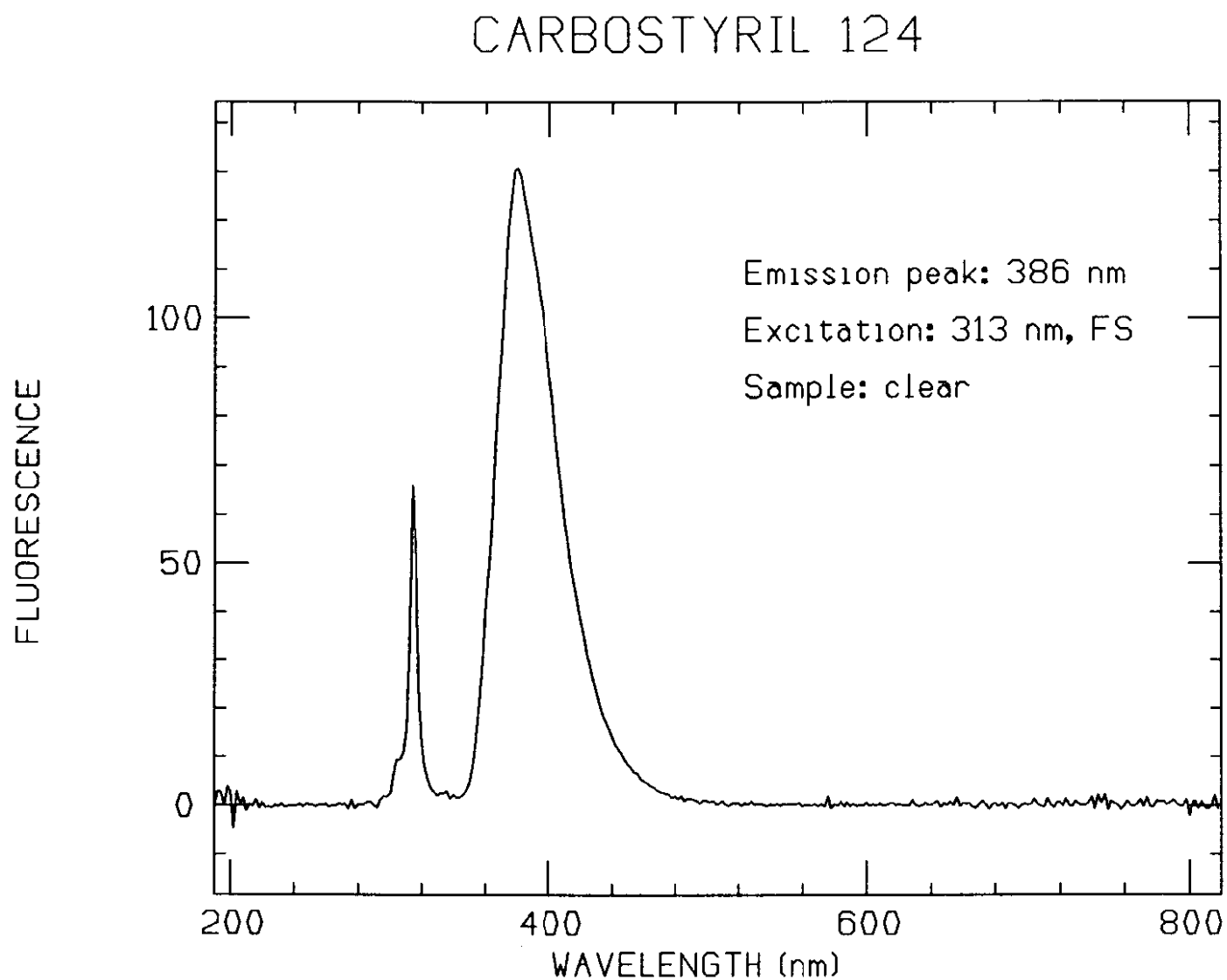

C540
Emission peak: 510 nm
Excitation: 400 nm, FS
Sample: yellow
FLUORESCENCE
2000
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

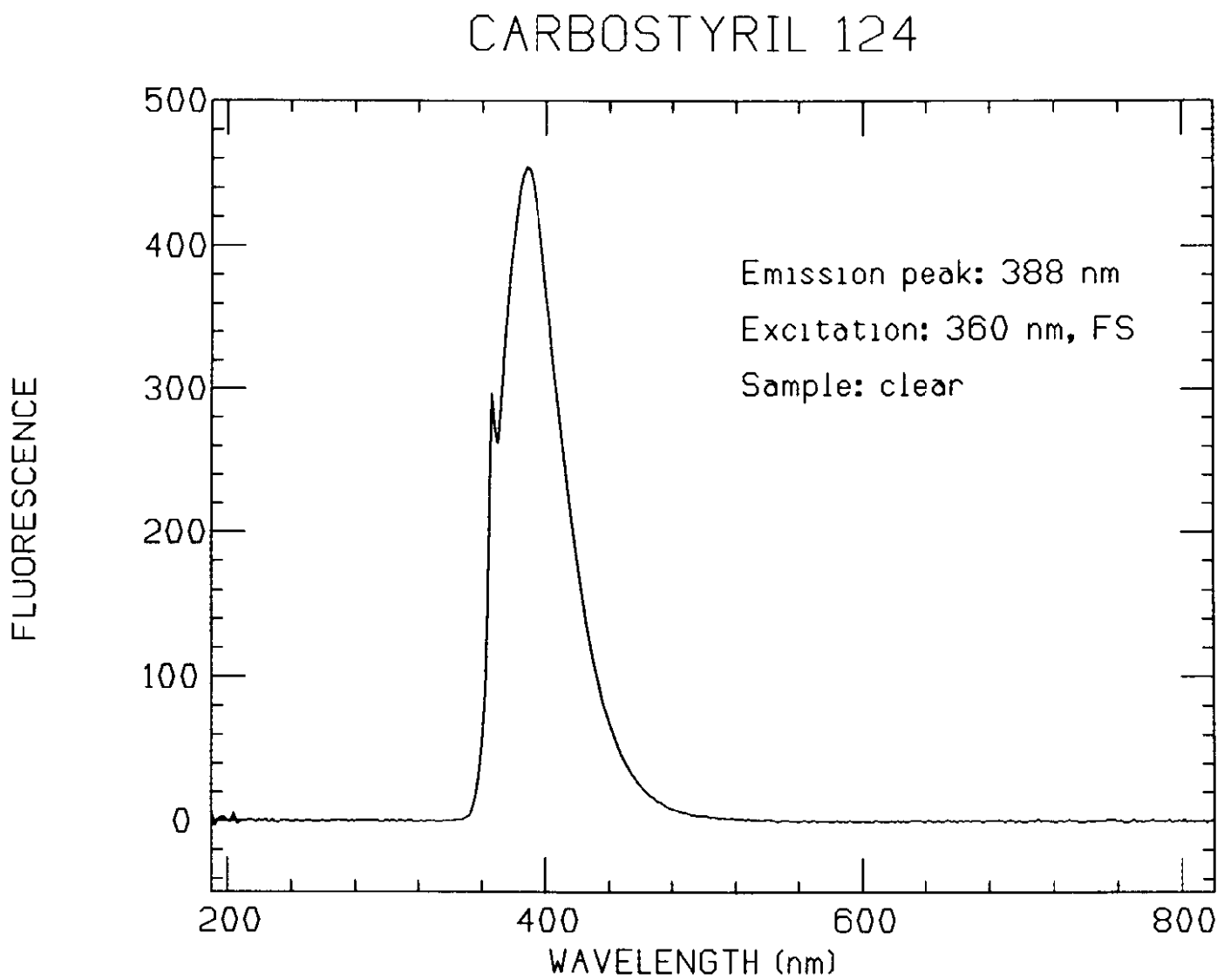

C545
Emission peak: 528 nm
Excitation: 313 nm, FS
Sample: yellow
FLUORESCENCE
400
200
0
200
400
600
800
WAVELENGTH (nm)

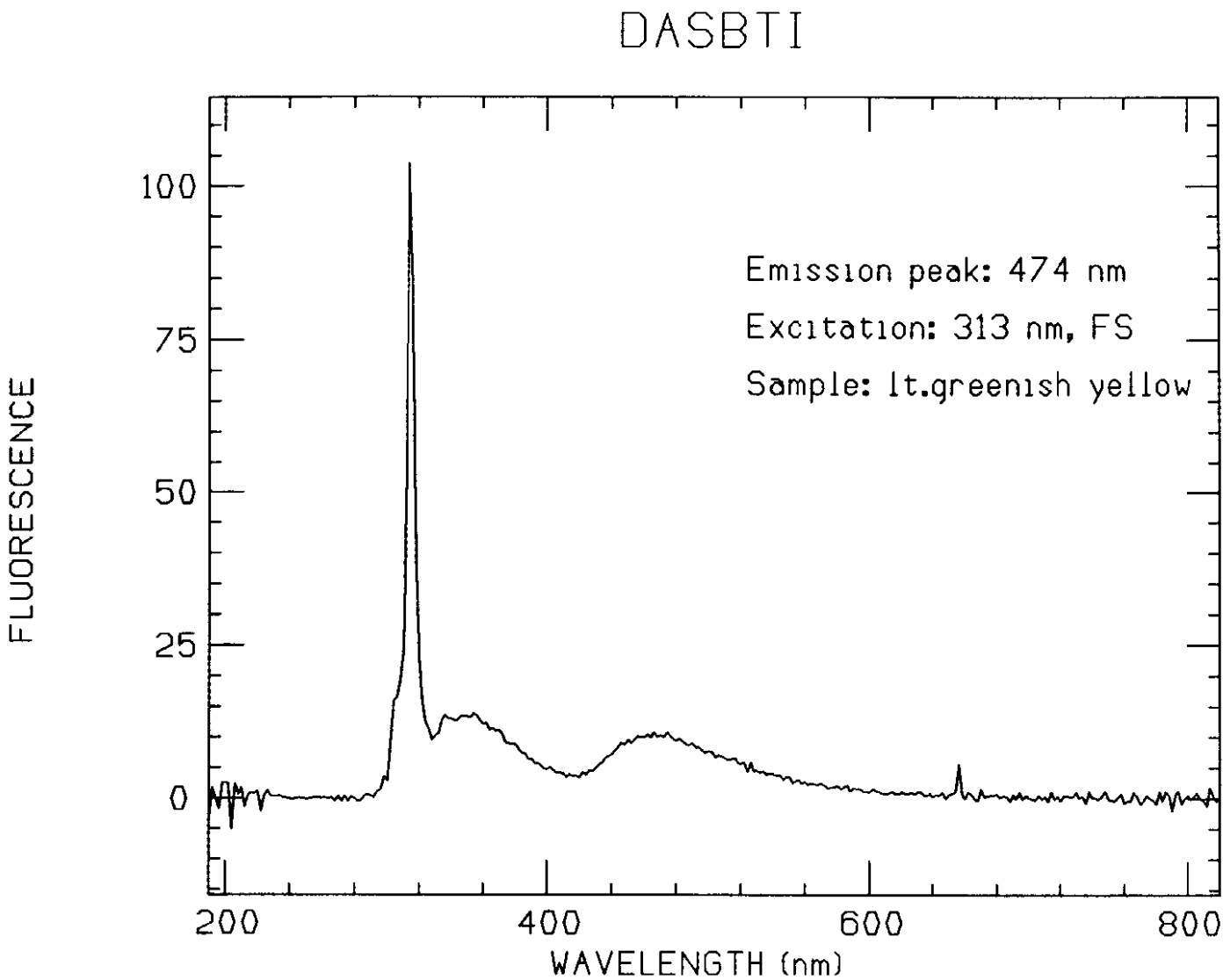

C545
Emission peak: 526 nm
Excitation: 400 nm, FS
Sample: yellow
FLUORESCENCE
2000
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

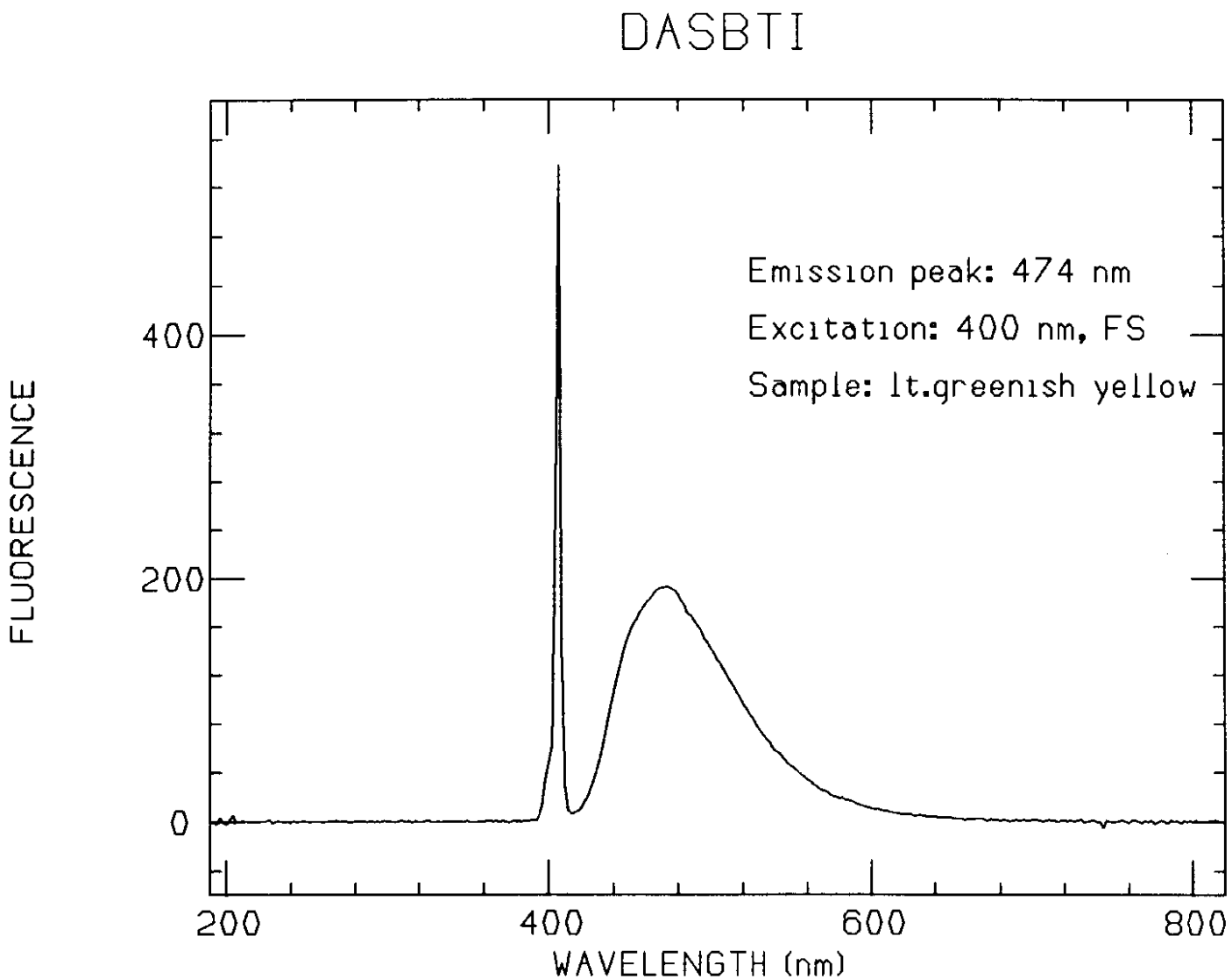

CARBOSTYRIL 3
Emission peak: 392 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

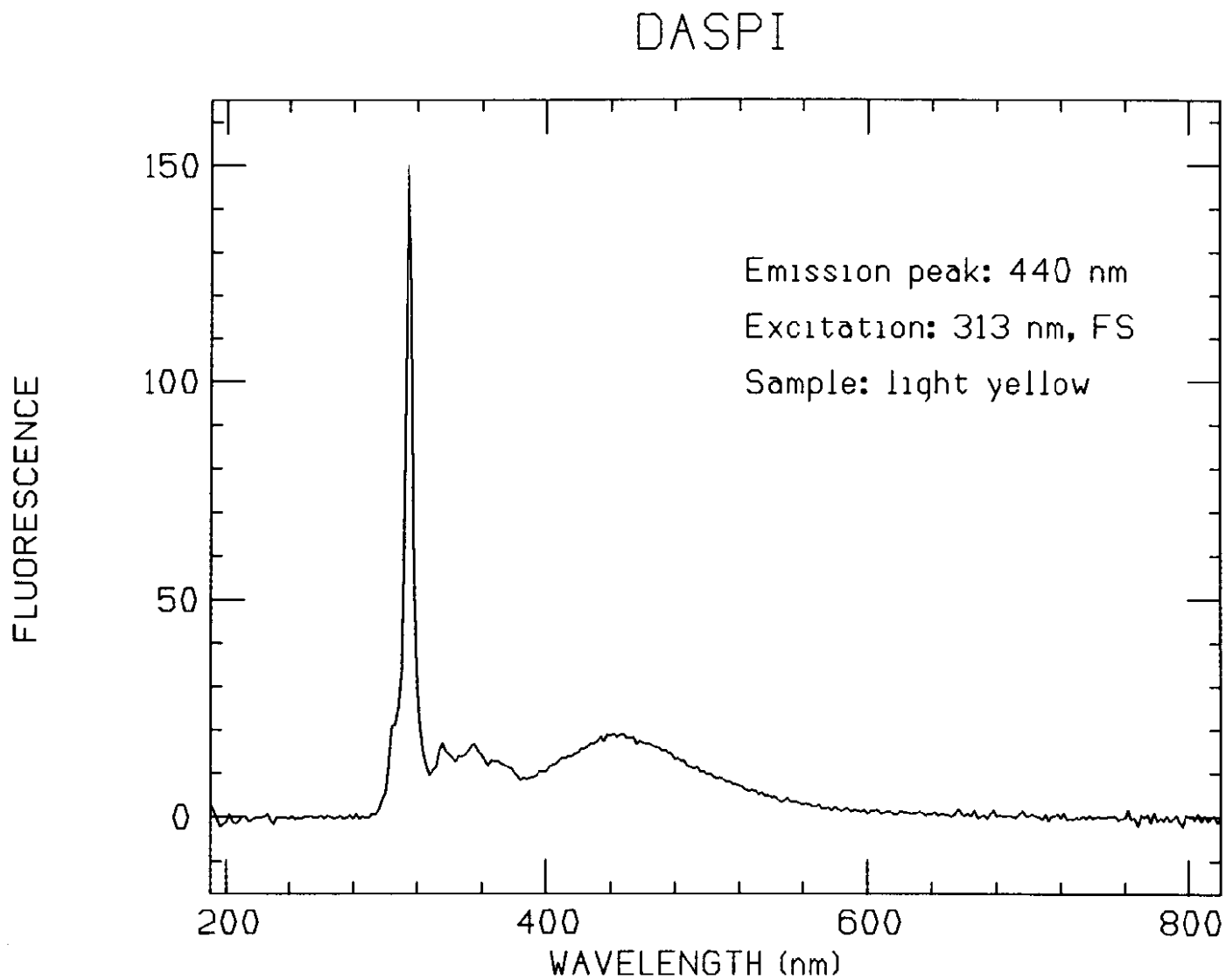

CARBOSTYRIL 3
Emission peak: 392 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
800
600
400
200
0
200
400
600
800
WAVELENGTH (nm)

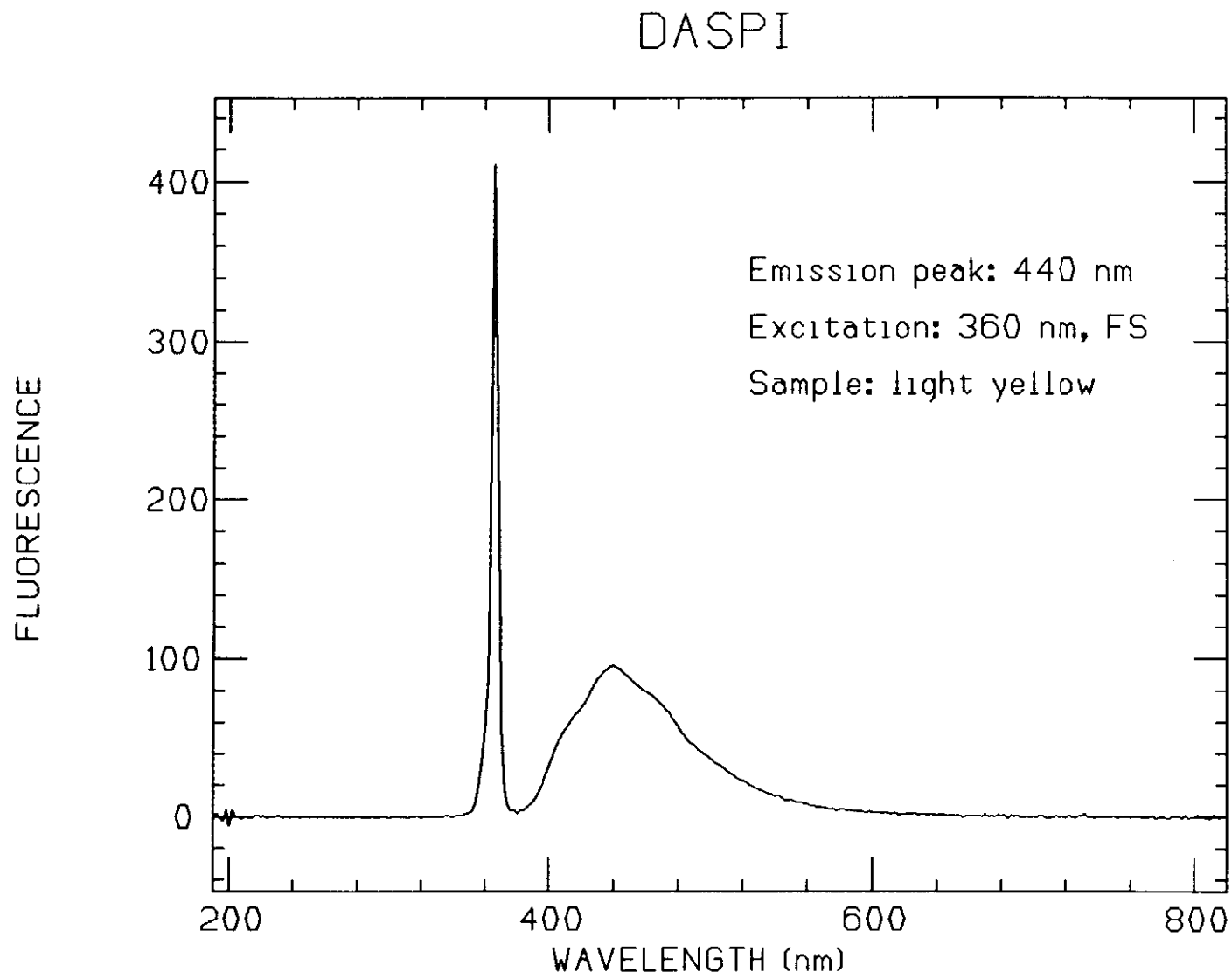

CARBOSTYRIL 124
Emission peak: 386 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
100
50
0
200
400
600
800
WAVELENGTH (nm)

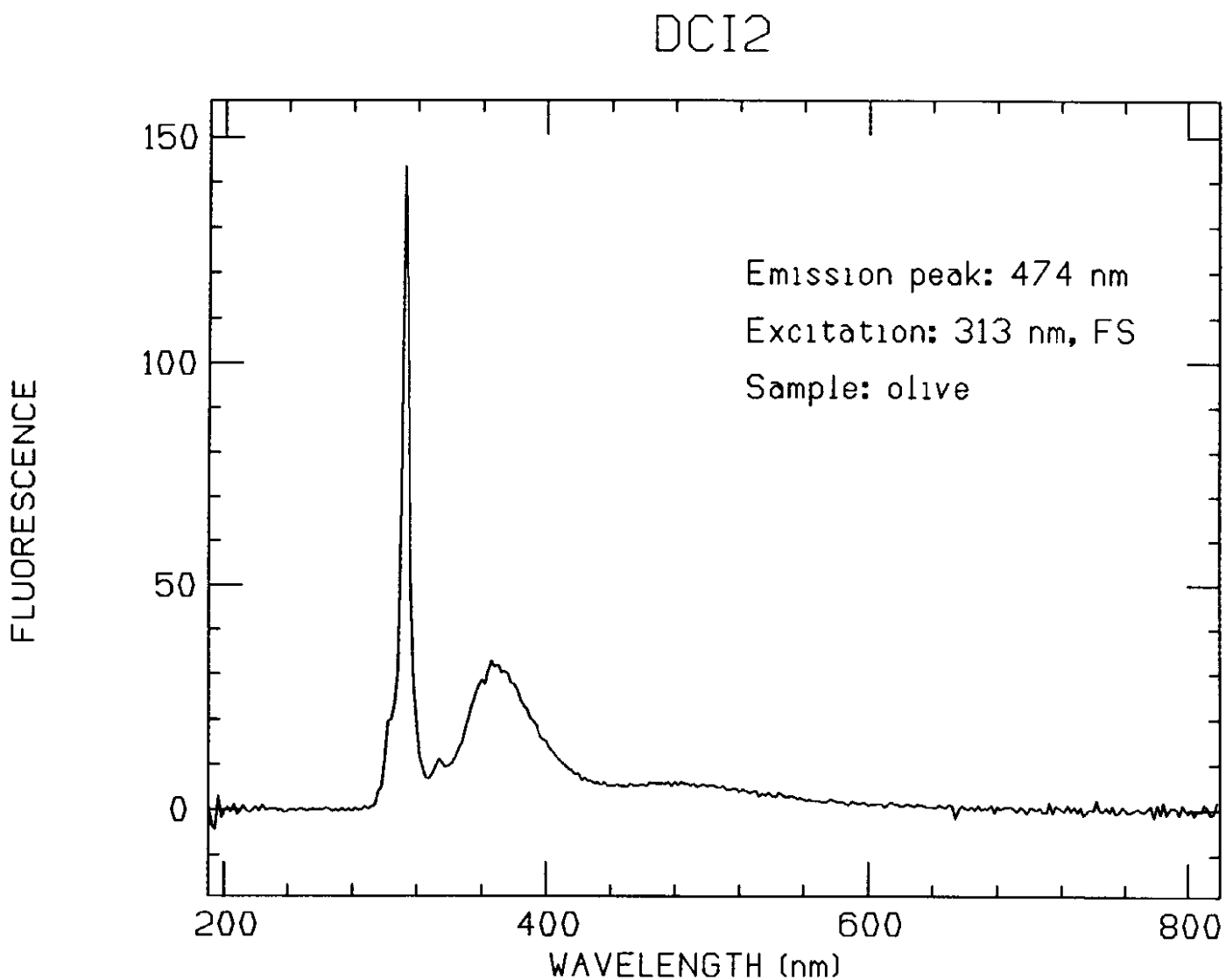

CARBOSTYRIL 124
Emission peak: 388 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
500
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

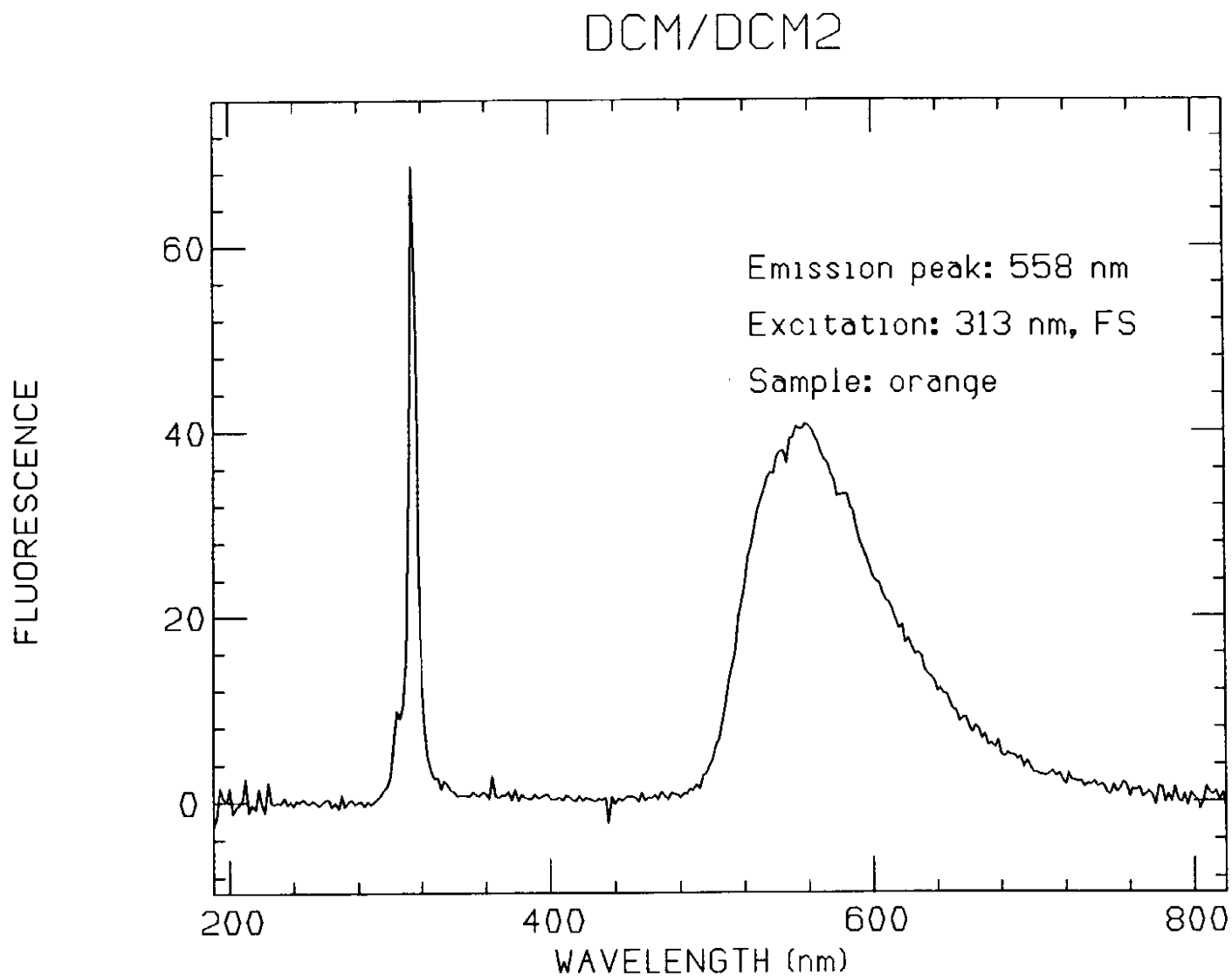

DASBTI
Emission peak: 474 nm
Excitation: 313 nm, FS
Sample: lt.greenish yellow
FLUORESCENCE
100
75
50
25
0
200
400
600
800
WAVELENGTH (nm)

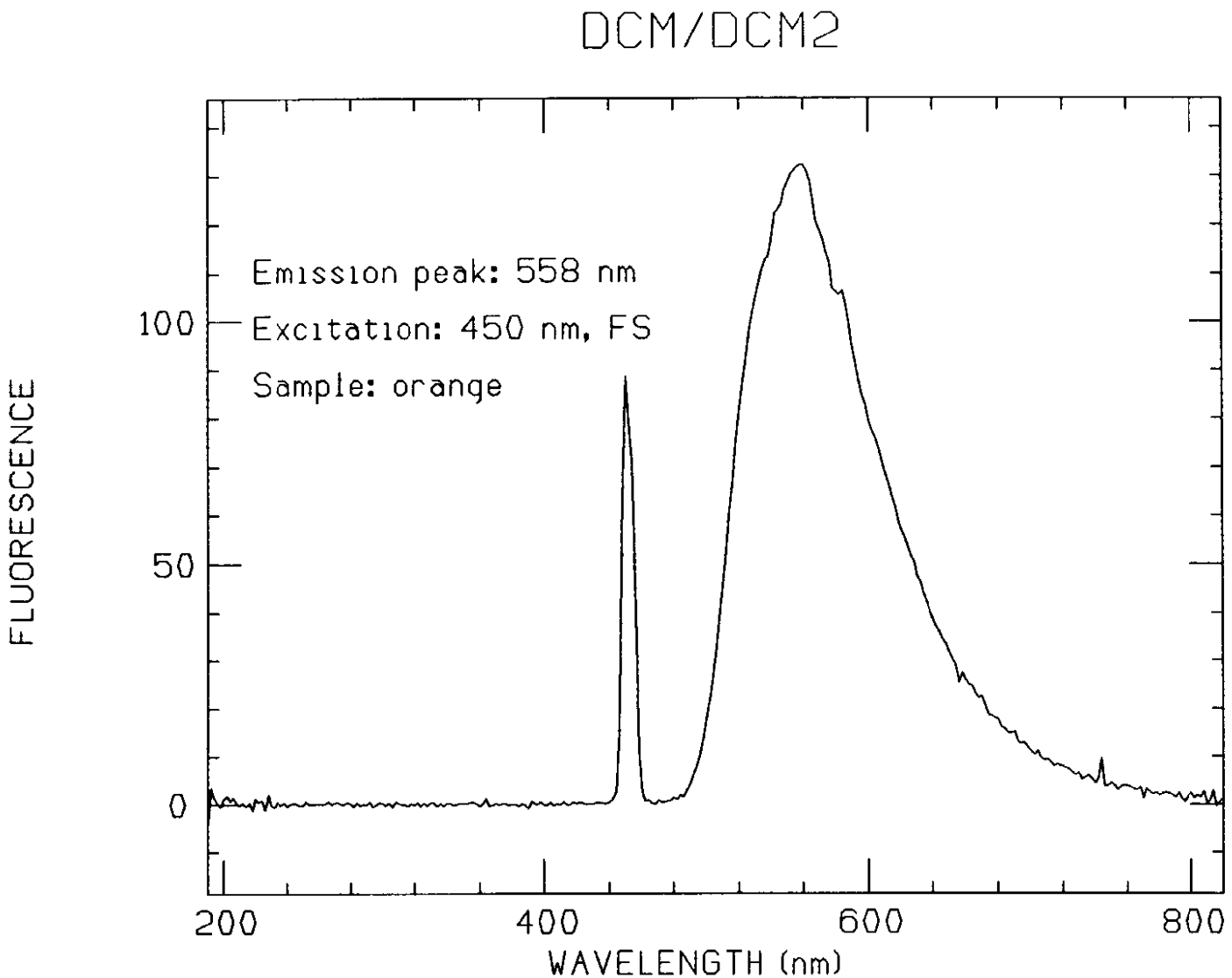

DASBTI
Emission peak: 474 nm
Excitation: 400 nm, FS
Sample: lt.greenish yellow
FLUORESCENCE
400
200
0
200
400
600
800
WAVELENGTH (nm)

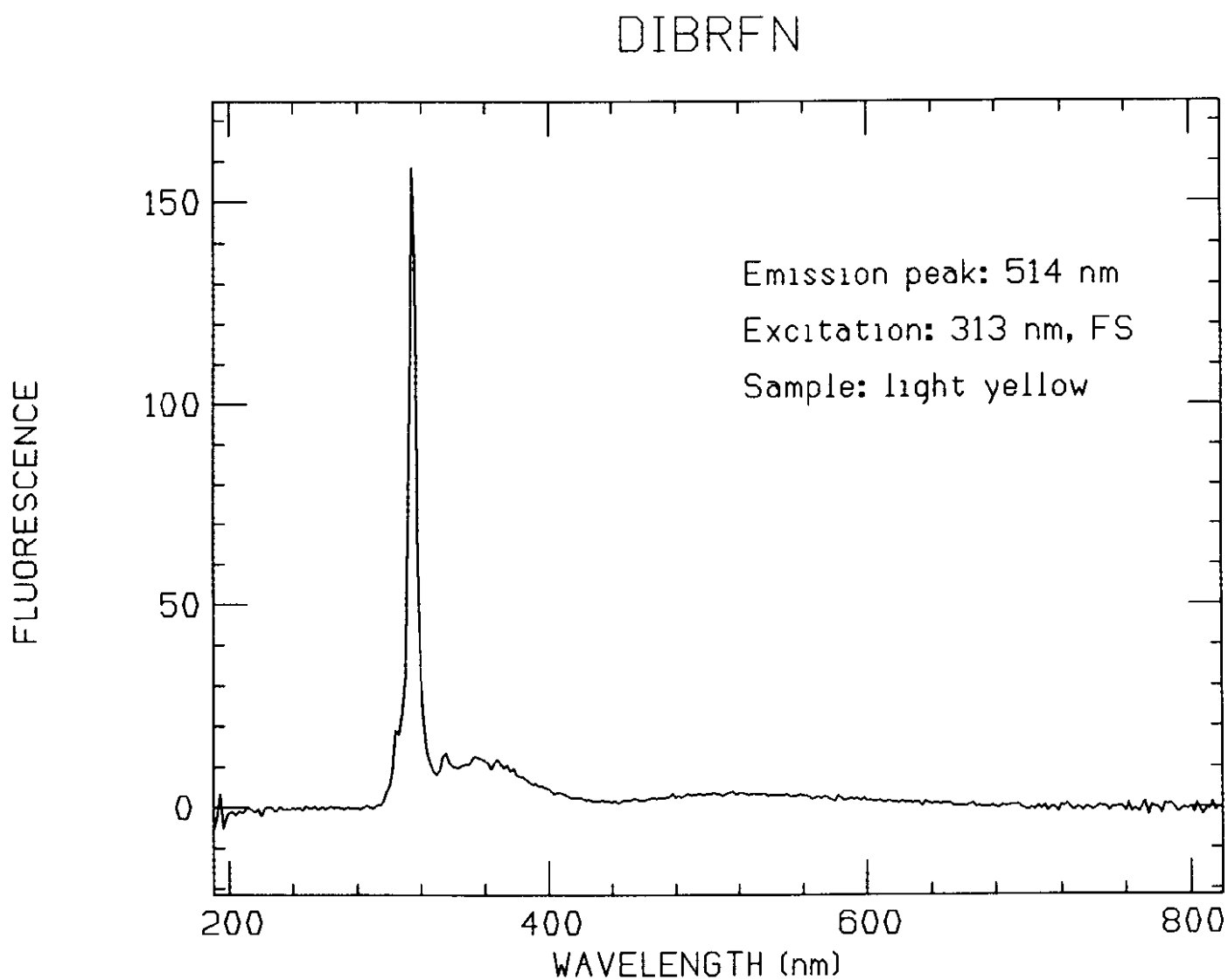

DASPI
Emission peak: 440 nm
Excitation: 313 nm, FS
Sample: light yellow
FLUORESCENCE
150
100
50
0
200
400
600
800
WAVELENGTH (nm)

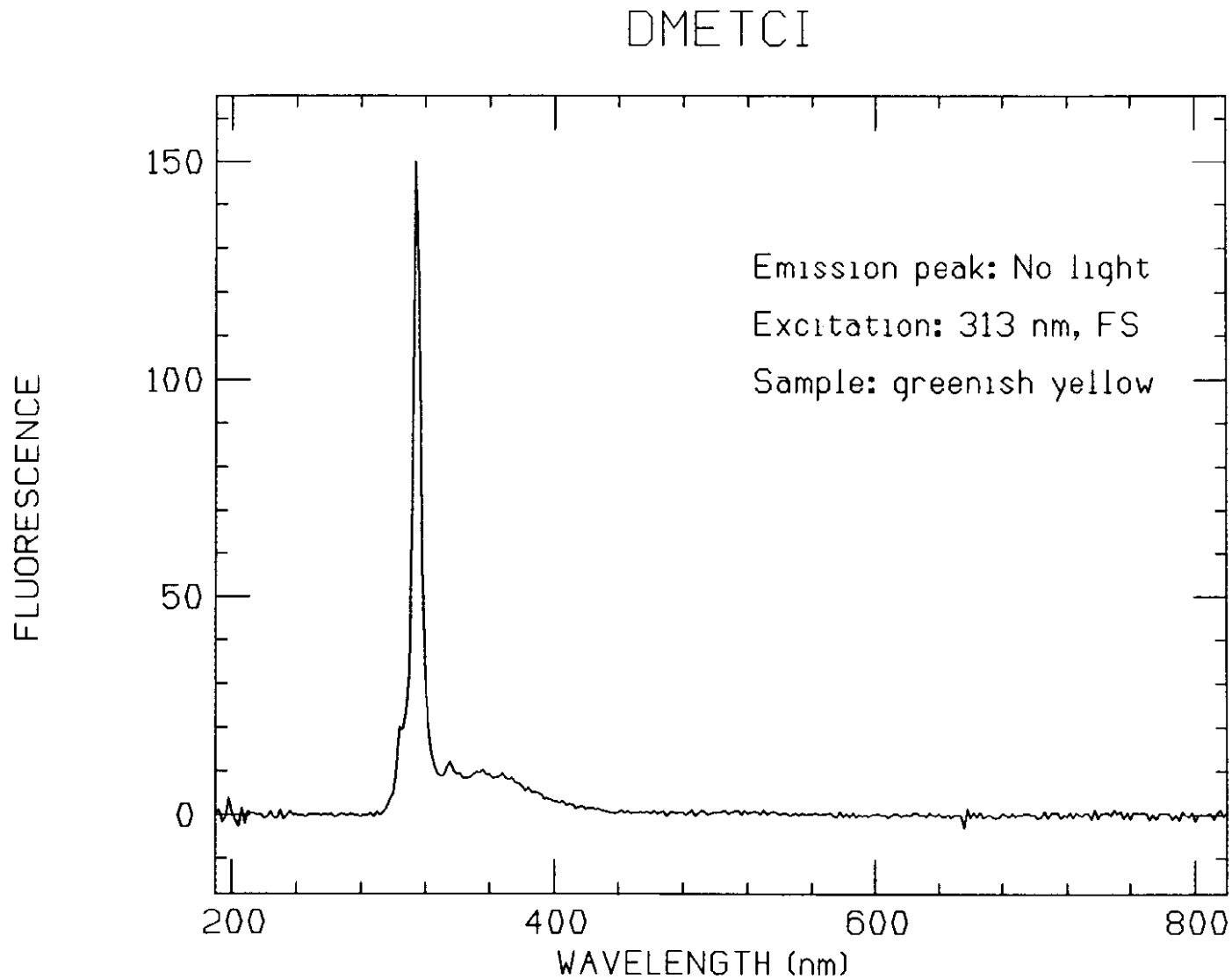

DASPI
Emission peak: 440 nm
Excitation: 360 nm, FS
Sample: light yellow
FLUORESCENCE
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

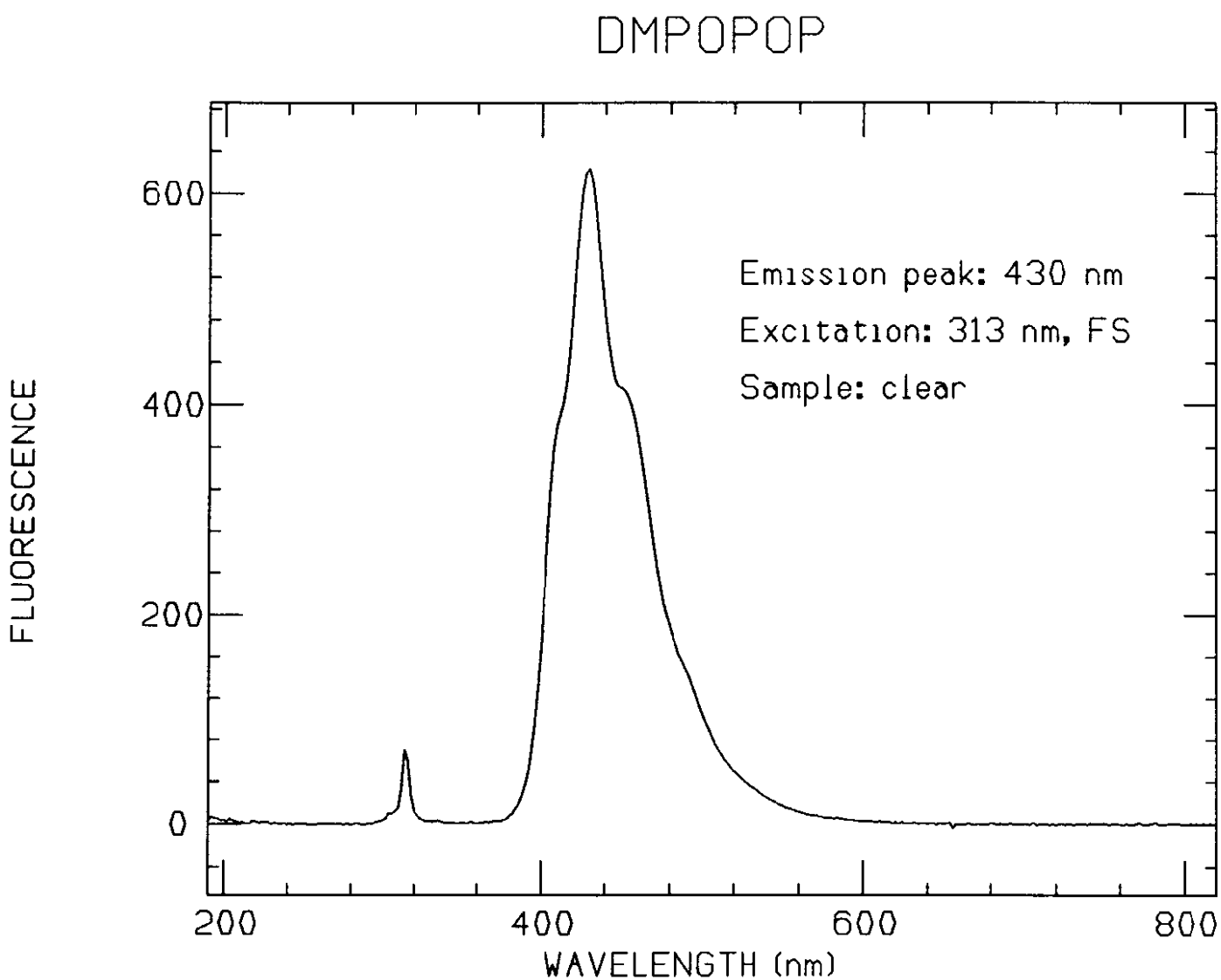

DCI2
Emission peak: 474 nm
Excitation: 313 nm, FS
Sample: olive
FLUORESCENCE
150
100
50
0
200
400
600
800
WAVELENGTH (nm)

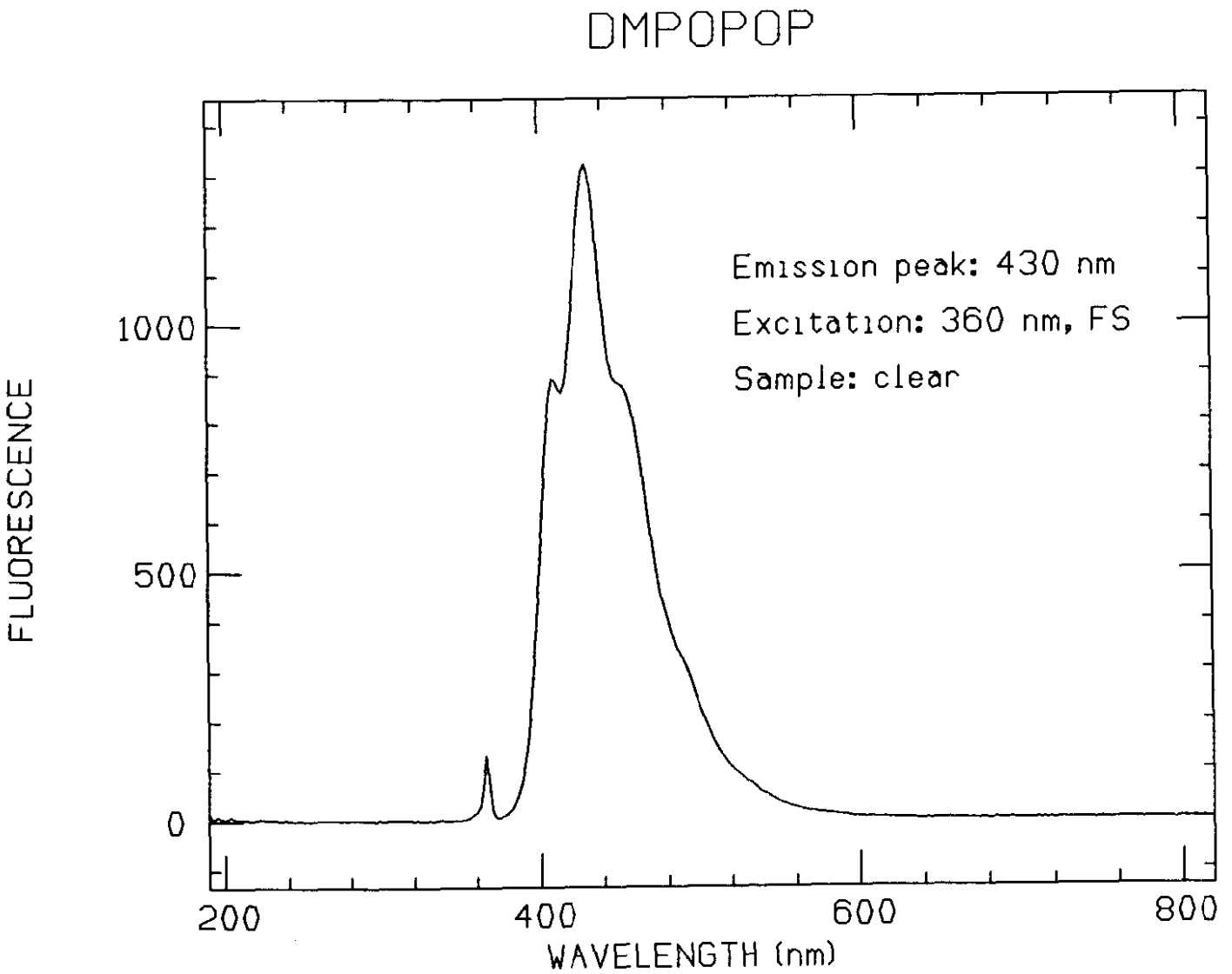

DCM/DCM2
Emission peak: 558 nm
Excitation: 313 nm, FS
Sample: orange
FLUORESCENCE
60
40
20
0
200
400
600
800
WAVELENGTH (nm)

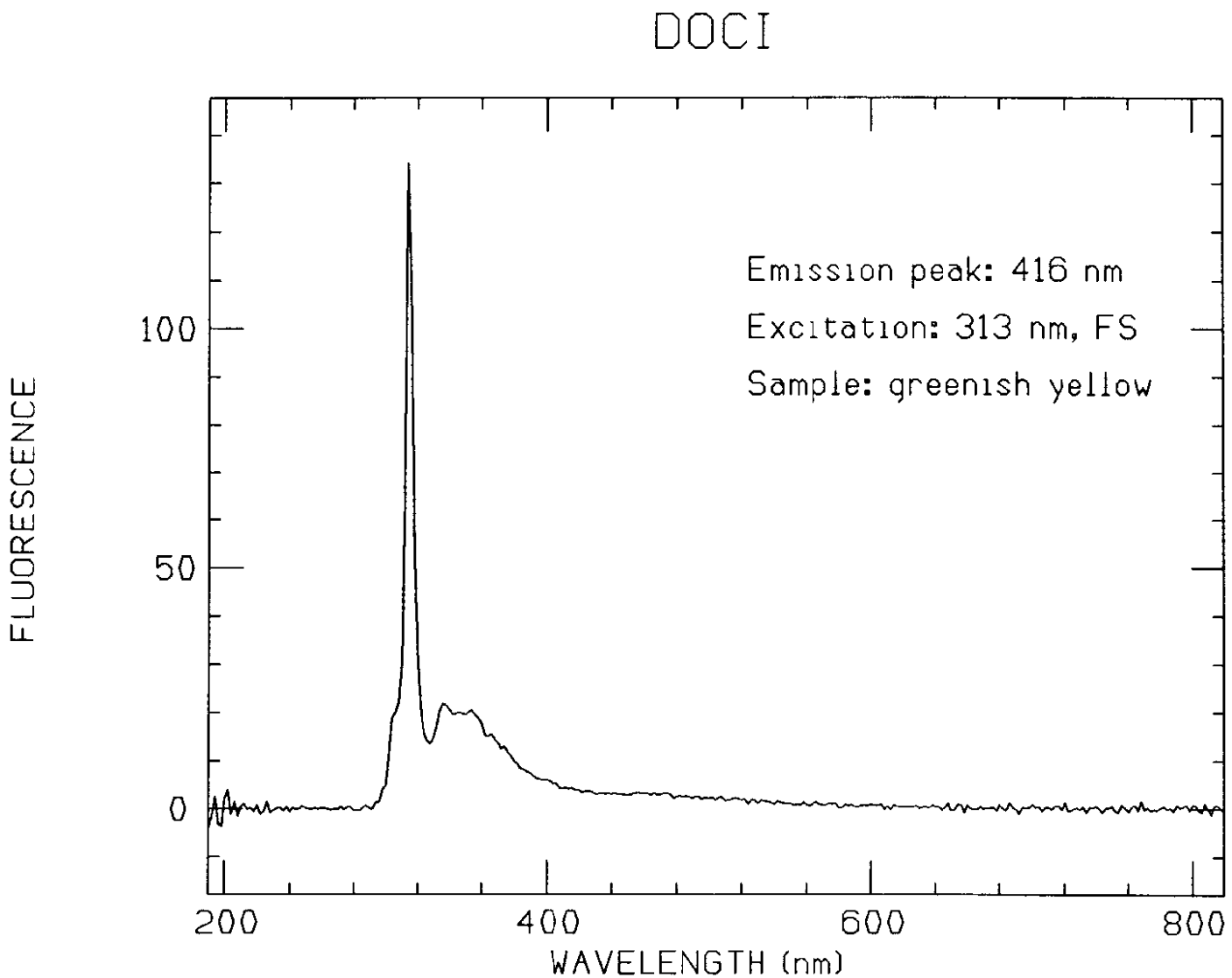

DCM/DCM2
Emission peak: 558 nm
Excitation: 450 nm, FS
Sample: orange
FLUORESCENCE
100
50
0
200
400
600
800
WAVELENGTH (nm)

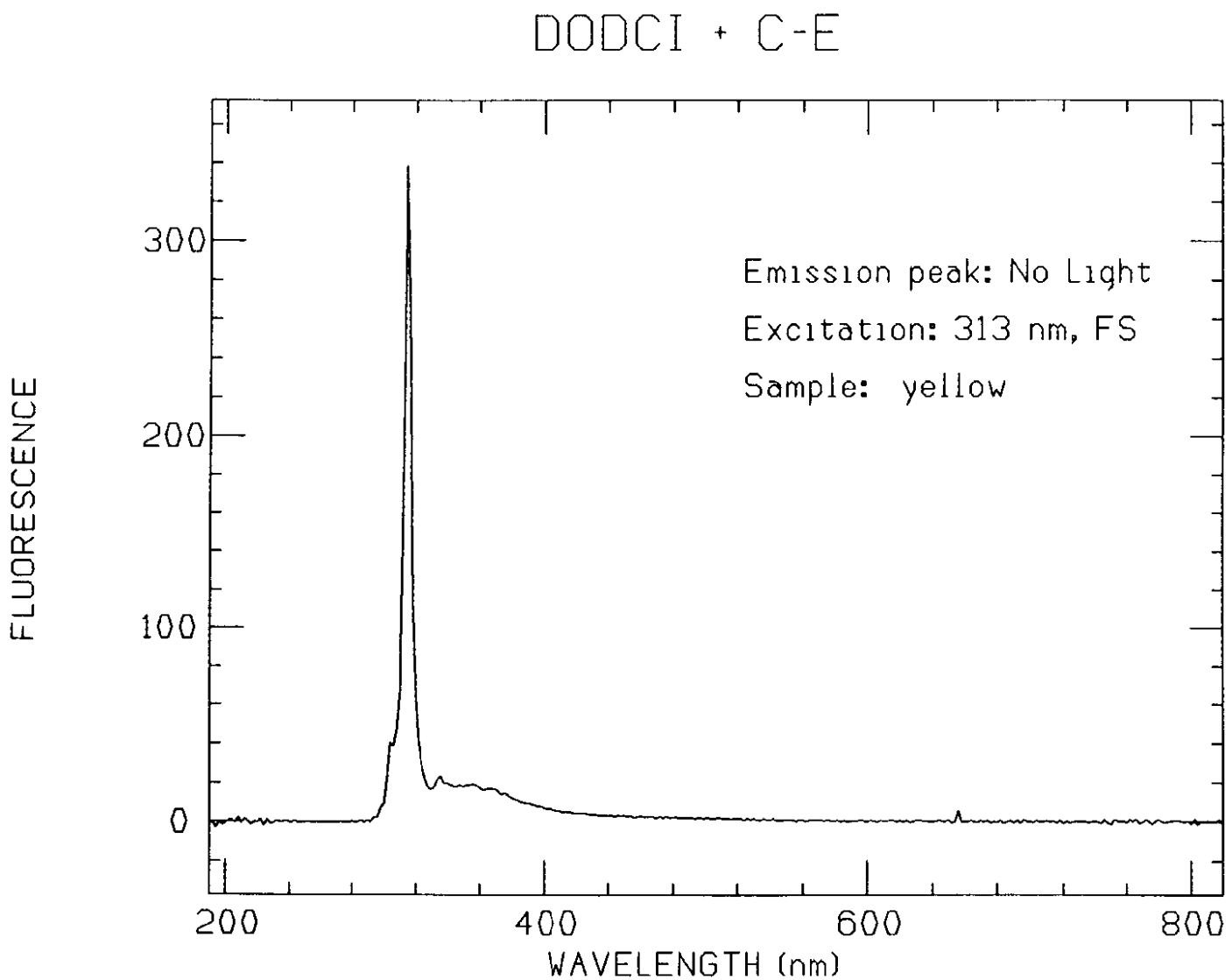

DIBRFN
Emission peak: 514 nm
Excitation: 313 nm, FS
Sample: light yellow
FLUORESCENCE
150
100
50
0
200
400
600
800
WAVELENGTH (nm)

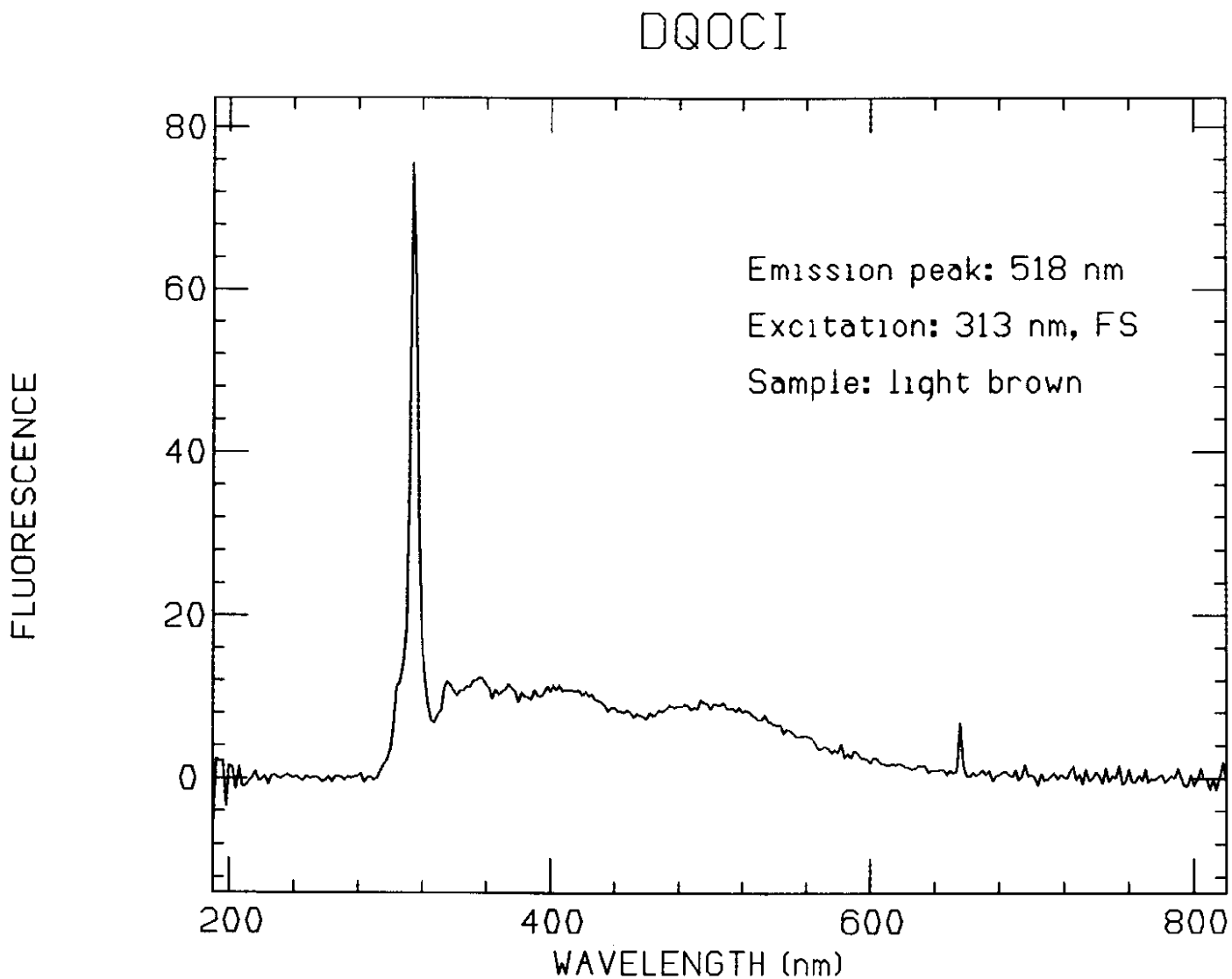

DMETCI
Emission peak: No light
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
150
100
50
0
200
400
600
800
WAVELENGTH (nm)

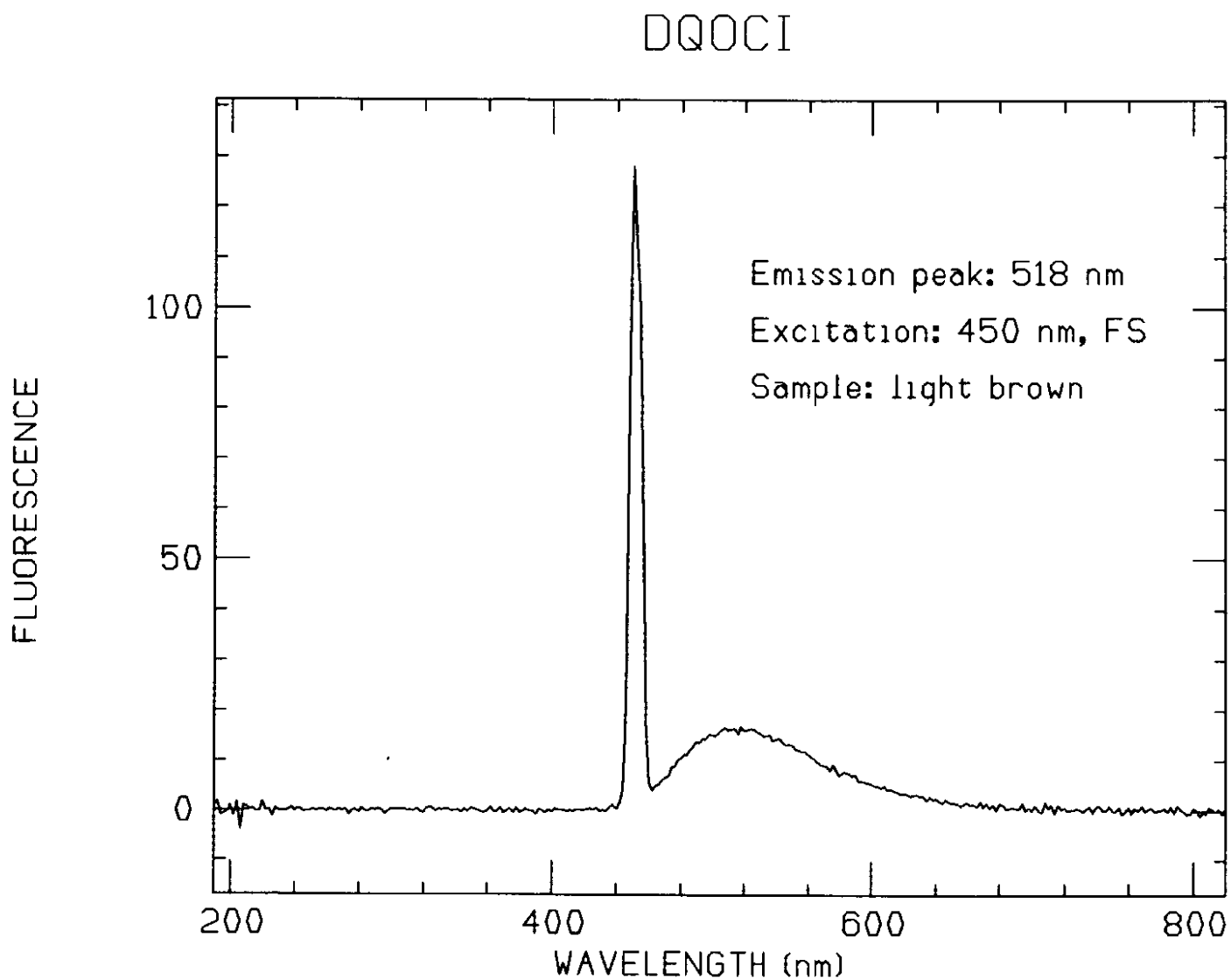

DMPOPOP
Emission peak: 430 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

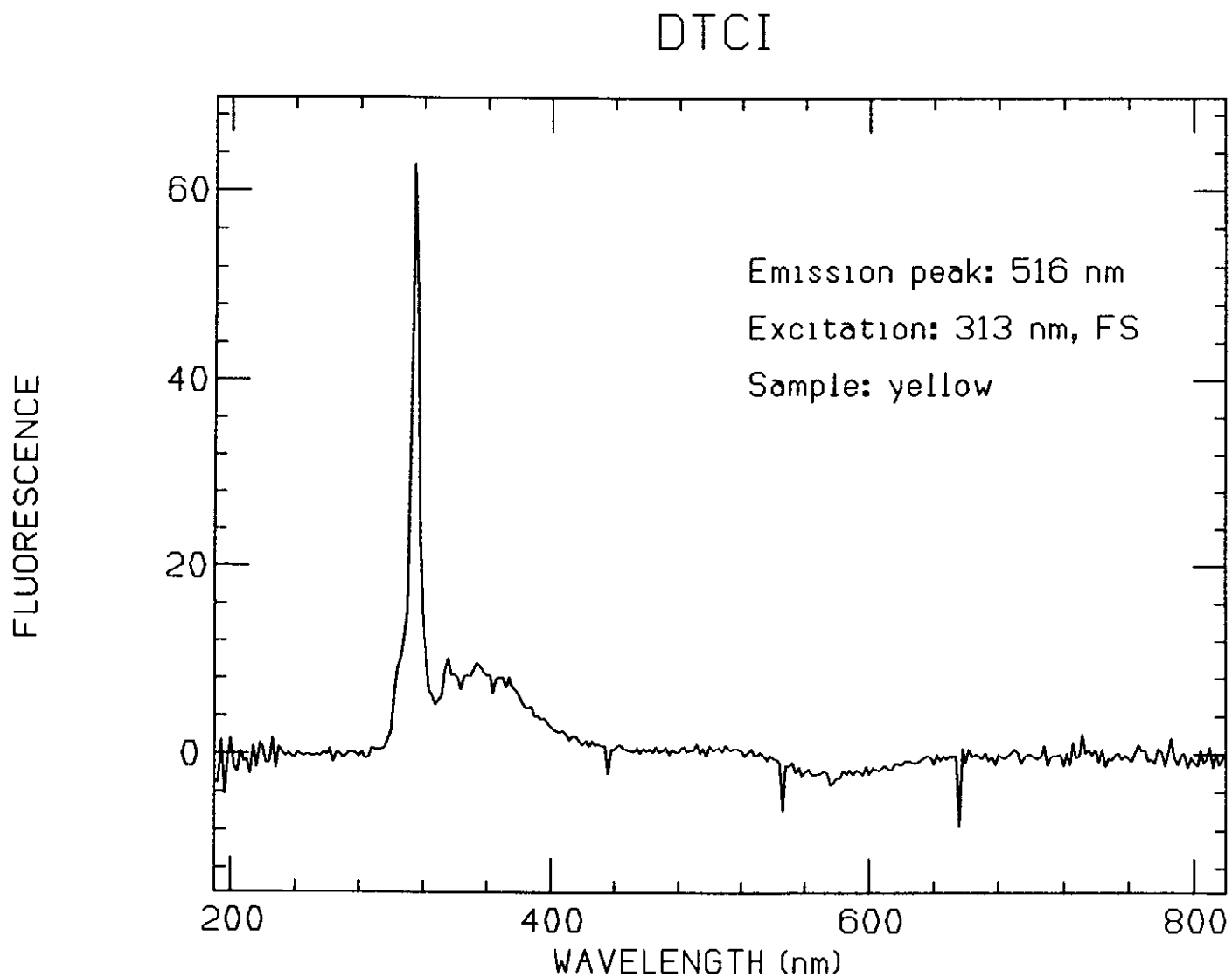

DMPOPOP
Emission peak: 430 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1000
500
0
200
400
600
800
WAVELENGTH (nm)

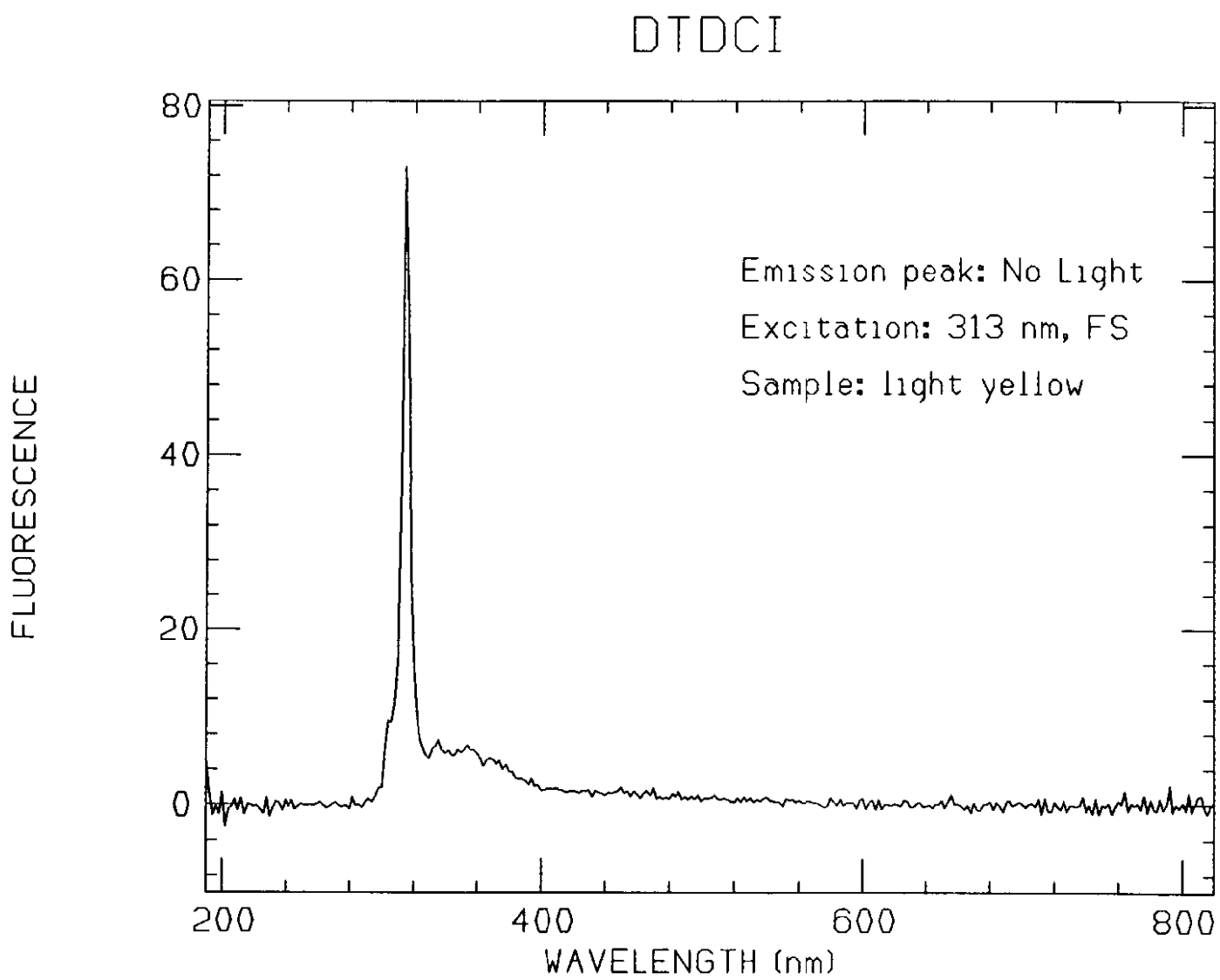

DOCI
Emission peak: 416 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
100
50
0
200
400
600
800
WAVELENGTH (nm)

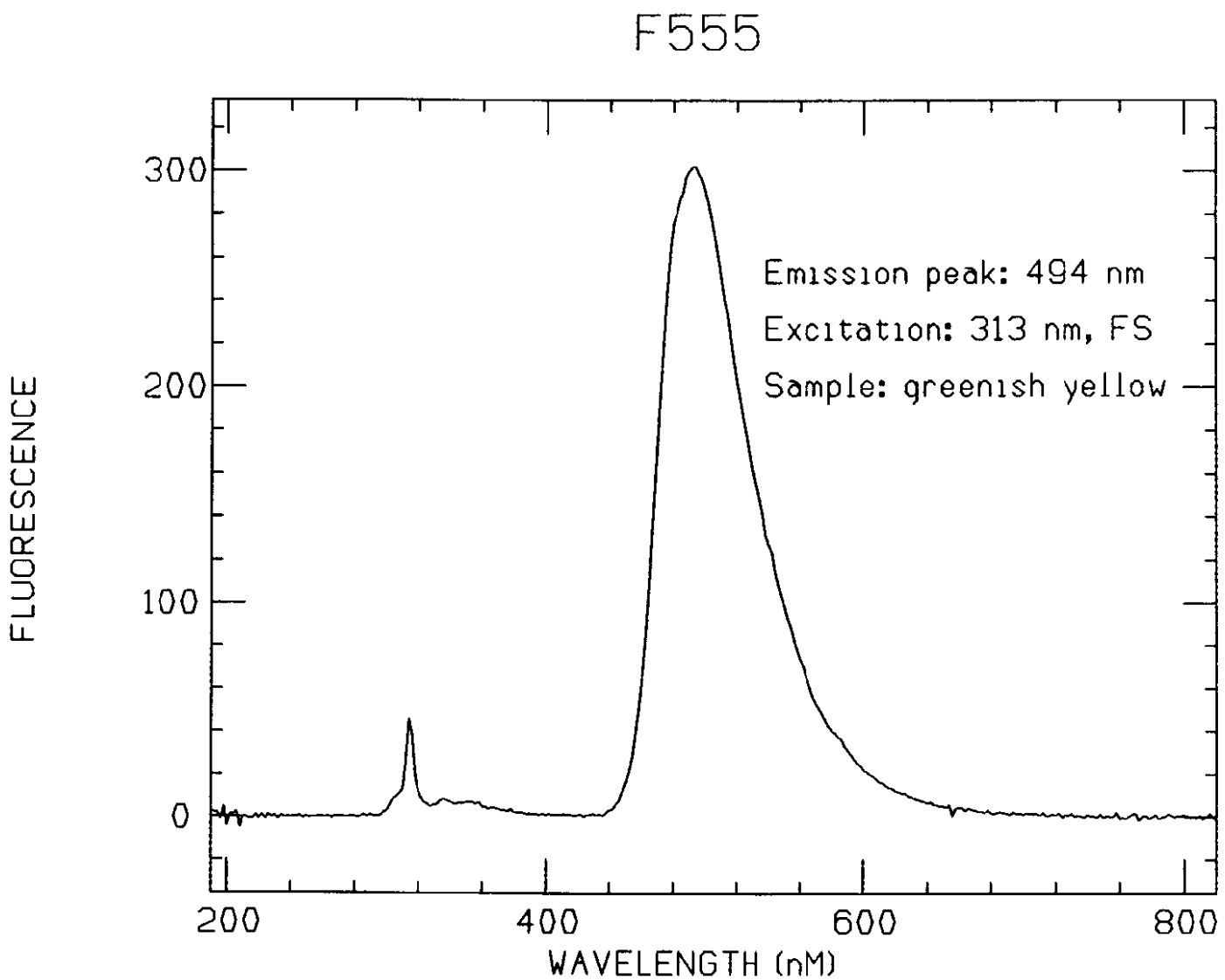

DODCI + C-E
Emission peak: No Light
Excitation: 313 nm, FS
Sample: yellow
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

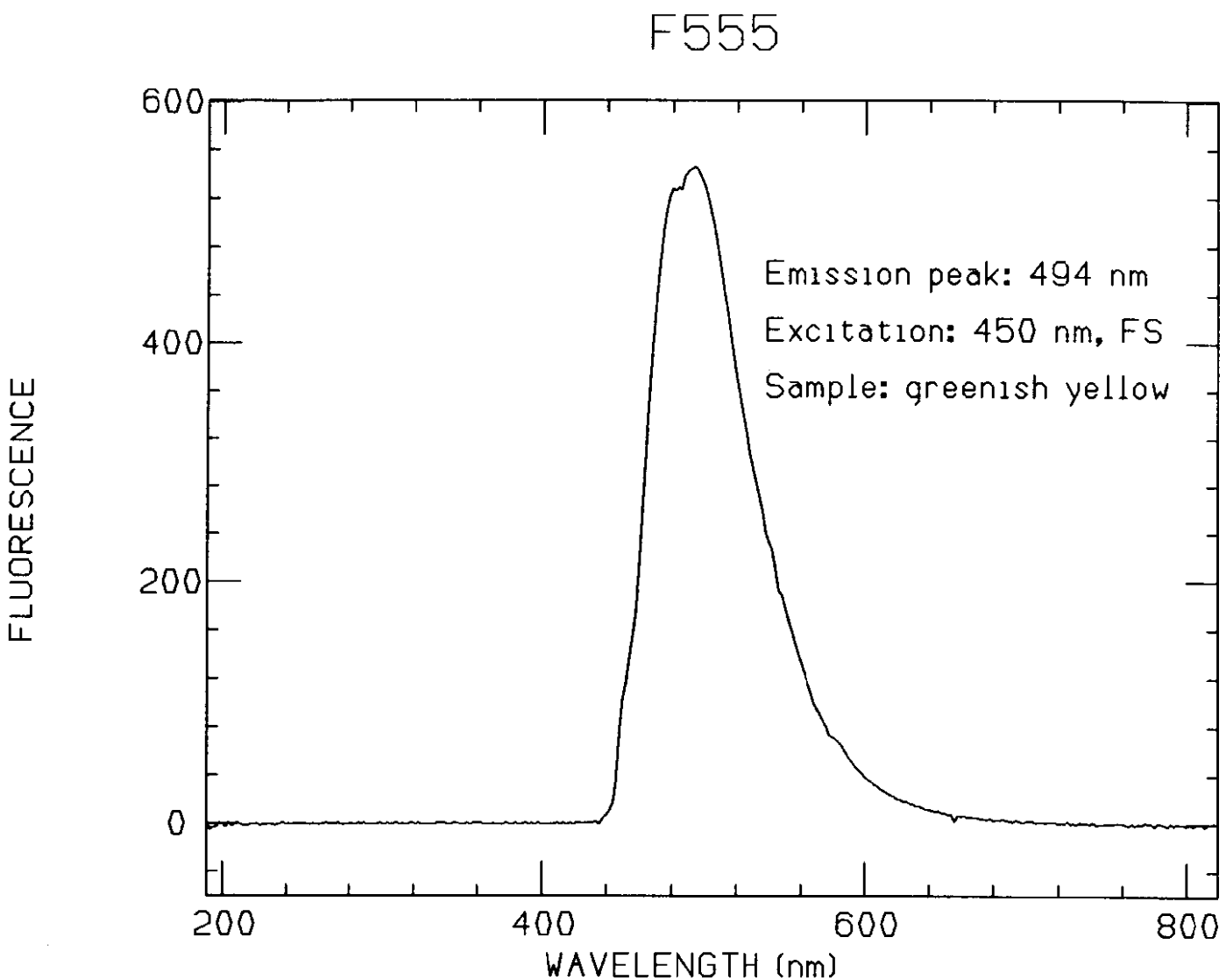

DQOCI
Emission peak: 518 nm
Excitation: 313 nm, FS
Sample: light brown
FLUORESCENCE
80
60
40
20
0
200
400
600
800
WAVELENGTH (nm)

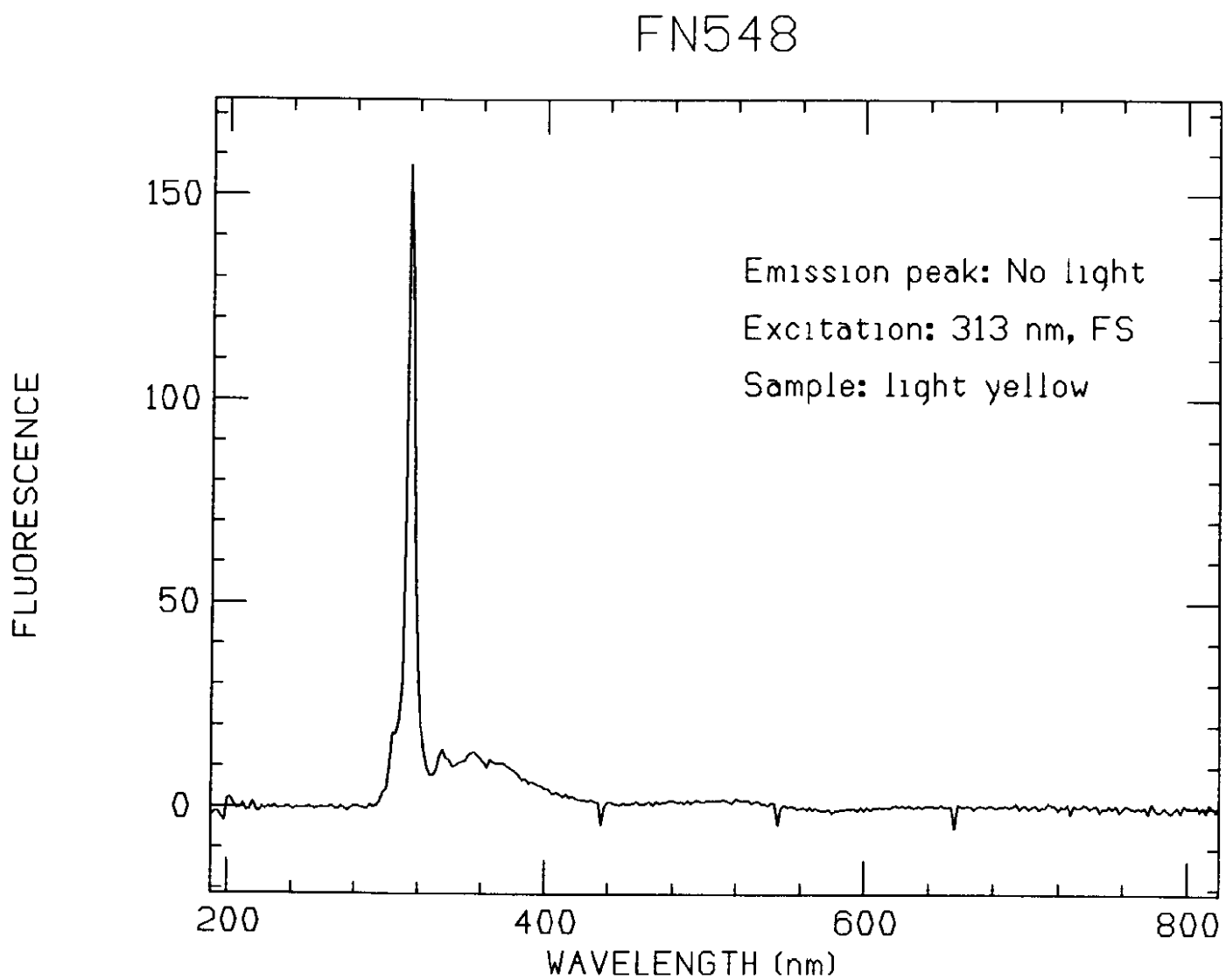

DQOCI
Emission peak: 518 nm
Excitation: 450 nm, FS
Sample: light brown
FLUORESCENCE
100
50
0
200
400
600
800
WAVELENGTH (nm)

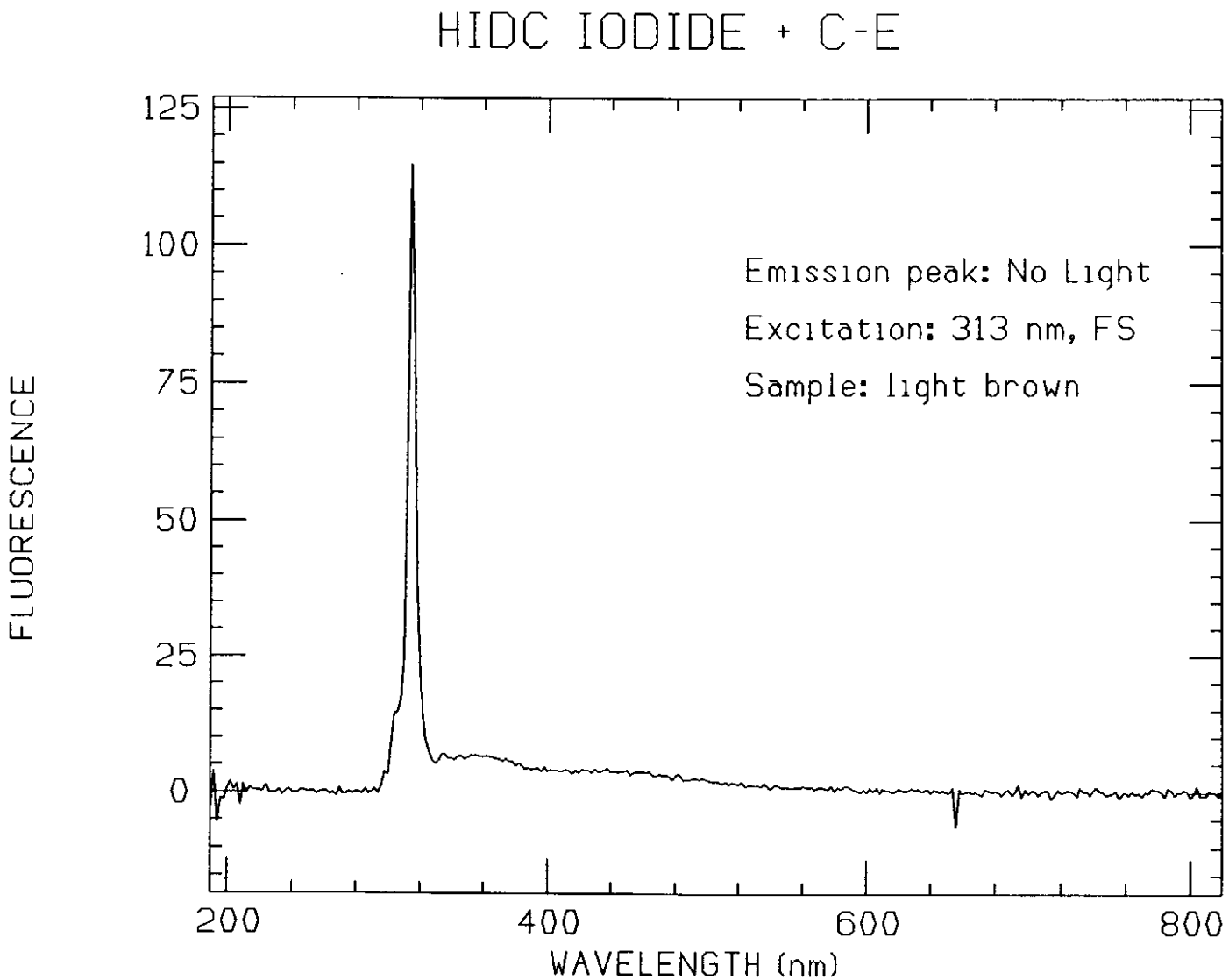

DTCI
Emission peak: 516 nm
Excitation: 313 nm, FS
Sample: yellow
FLUORESCENCE
60
40
20
0
200
400
600
800
WAVELENGTH (nm)

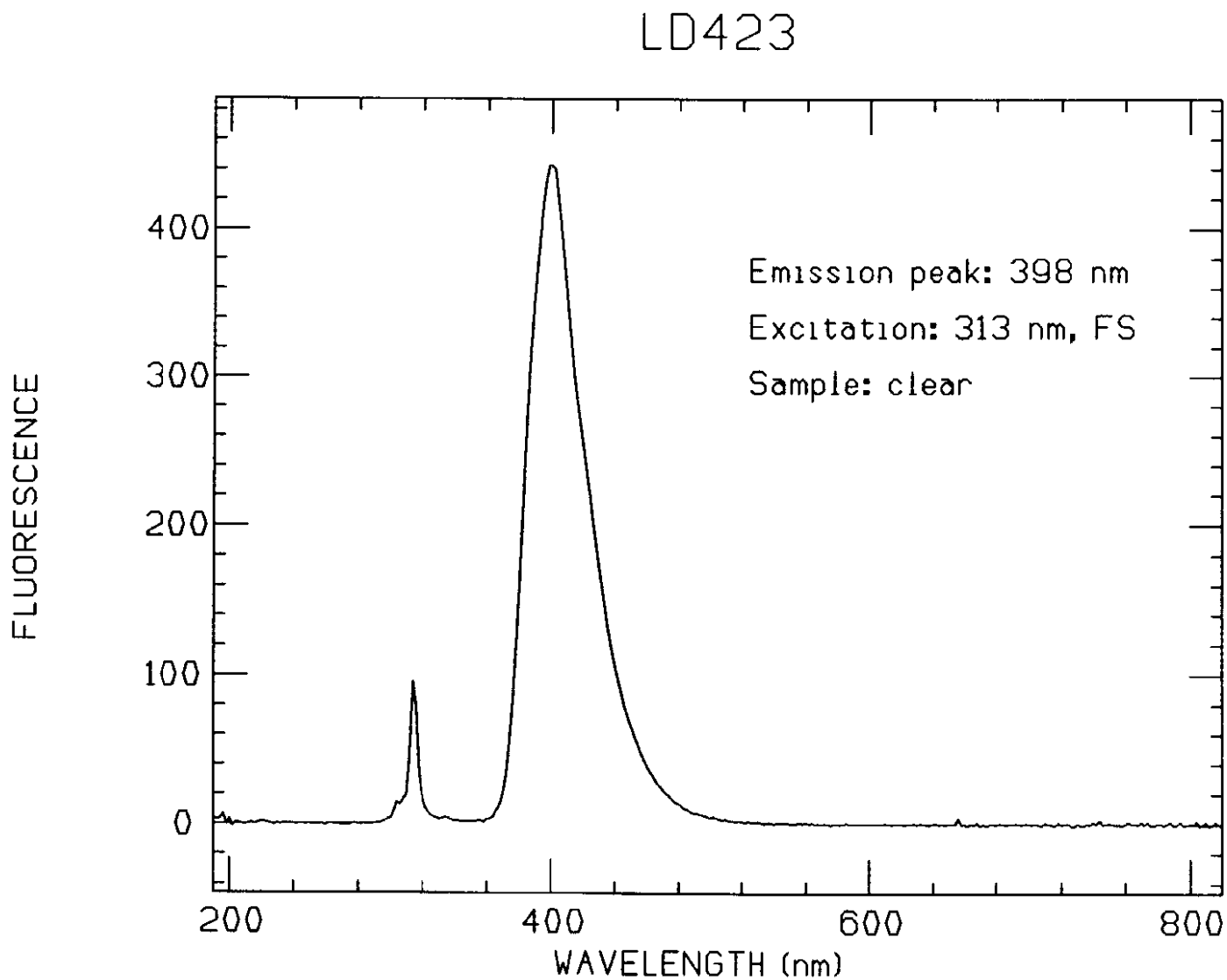

DTDCI
Emission peak: No Light
Excitation: 313 nm, FS
Sample: light yellow
FLUORESCENCE
80
60
40
20
0
200
400
600
800
WAVELENGTH (nm)

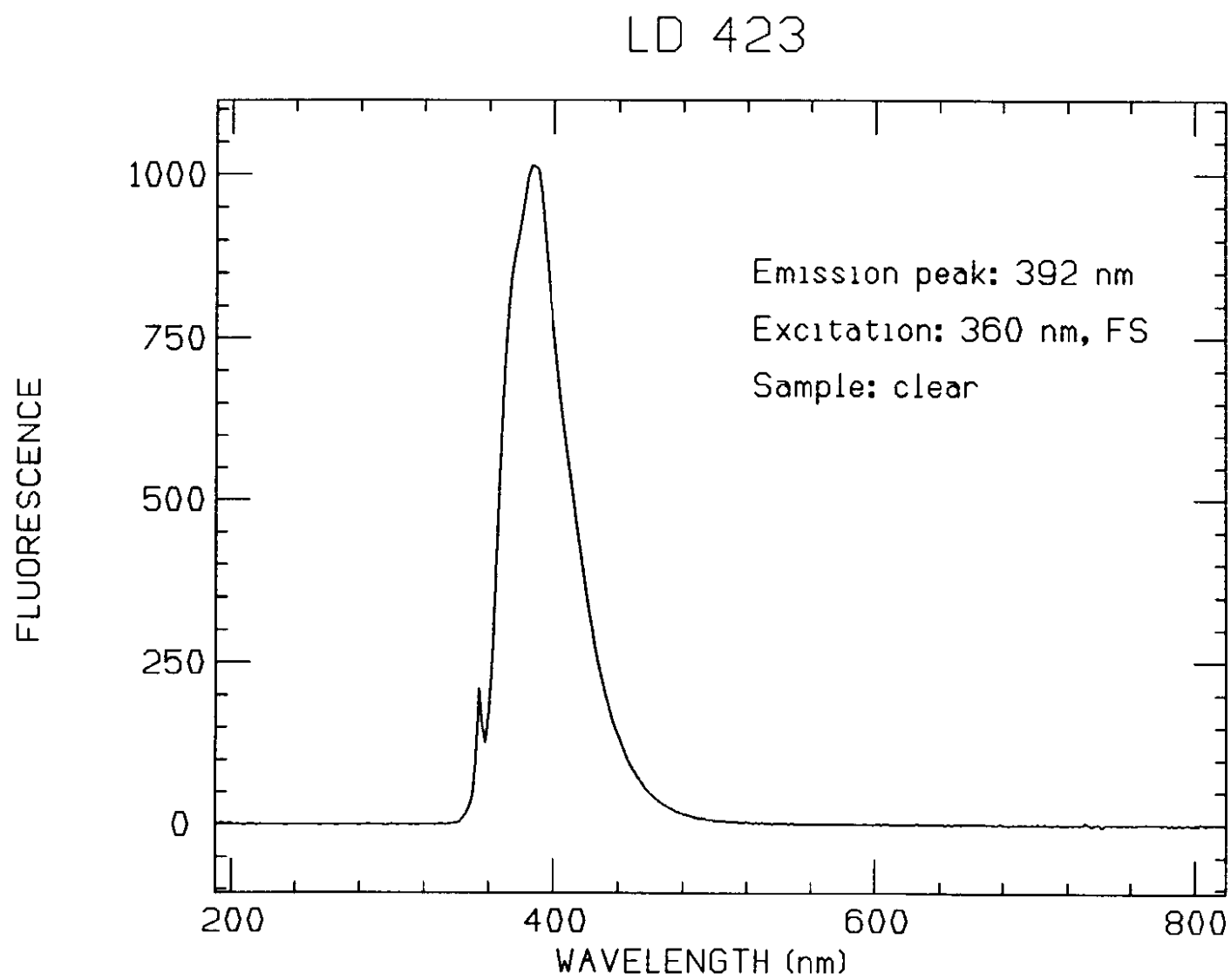

F555
Emission peak: 494 nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nM)

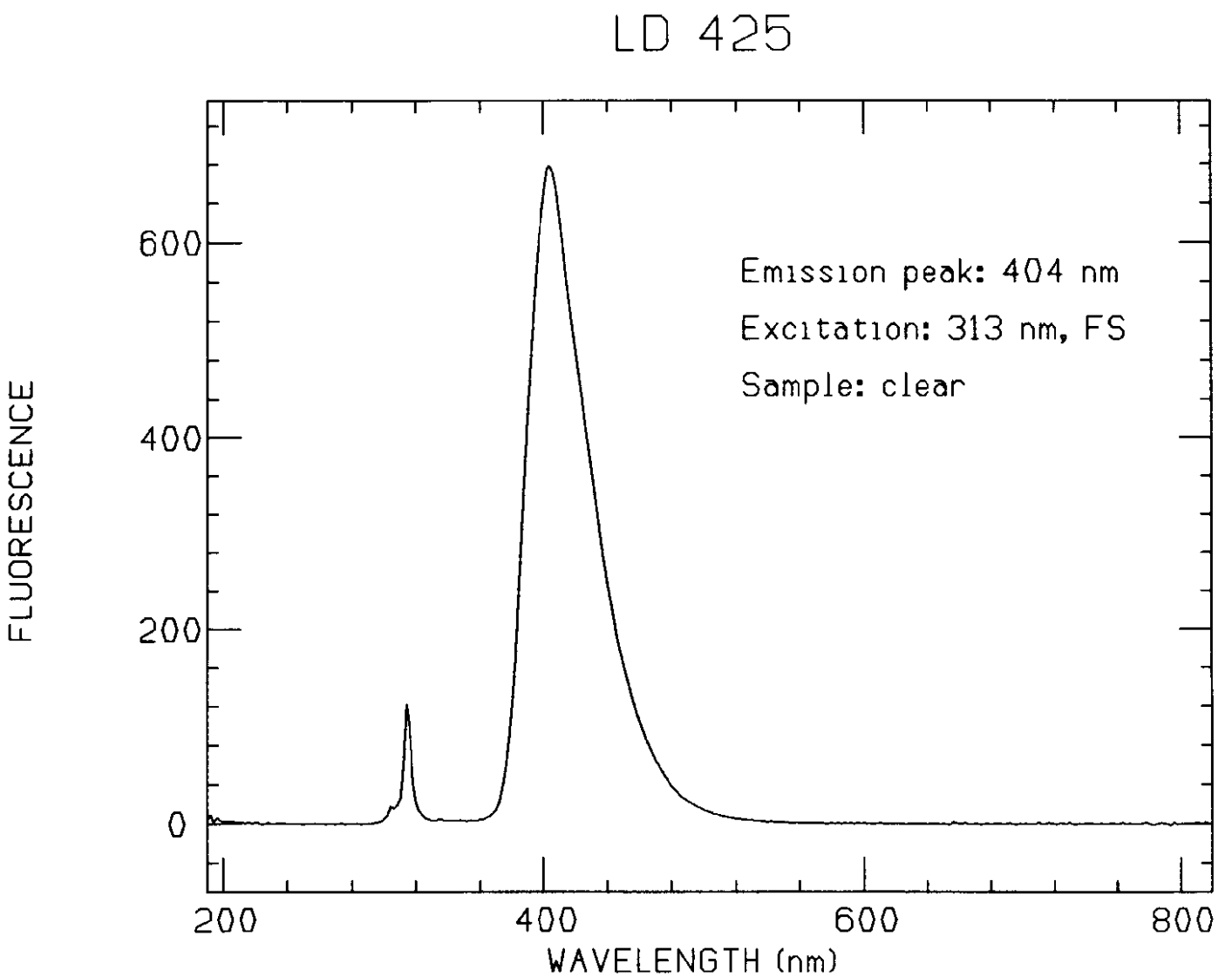

F555
Emission peak: 494 nm
Excitation: 450 nm, FS
Sample: greenish yellow
FLUORESCENCE
600
400
200
0
200
400
600
800
WAVELENGTH (nm)

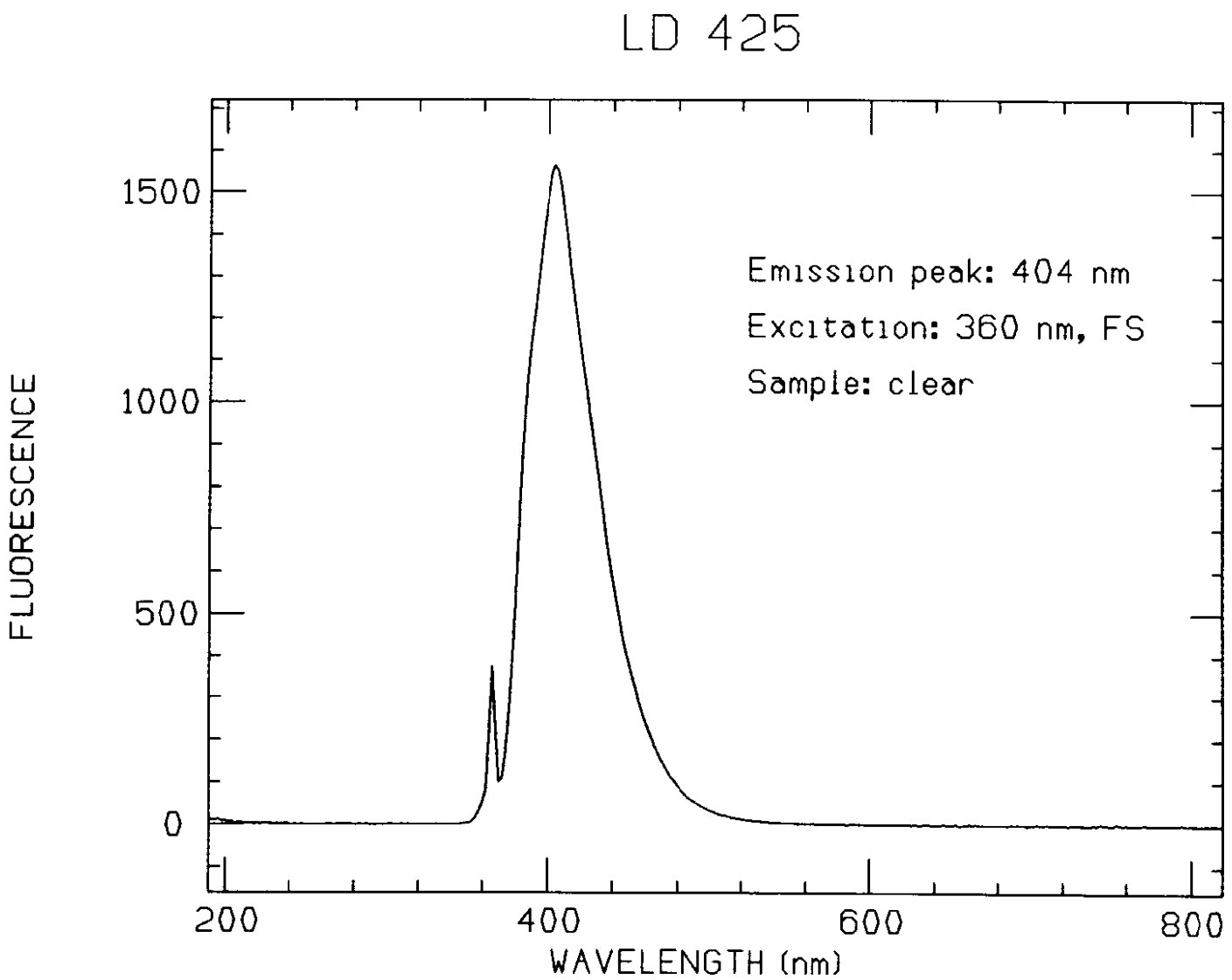

FN548
Emission peak: No light
Excitation: 313 nm, FS
Sample: light yellow
FLUORESCENCE
150
100
50
0
200
400
600
800
WAVELENGTH (nm)

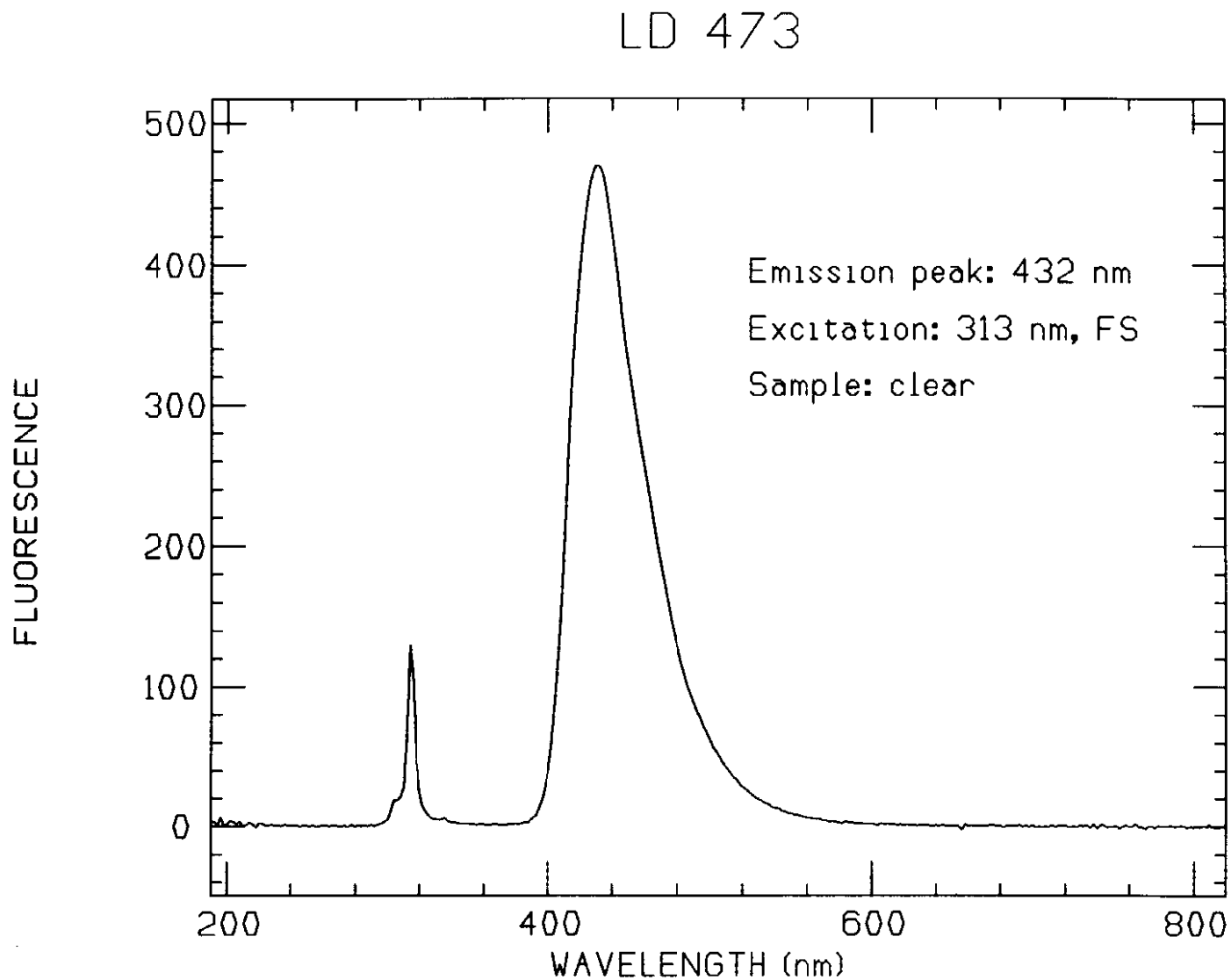

HIDC IODIDE + C-E
Emission peak: No Light
Excitation: 313 nm, FS
Sample: light brown
FLUORESCENCE
125
100
75
50
25
0
200
400
600
800
WAVELENGTH (nm)

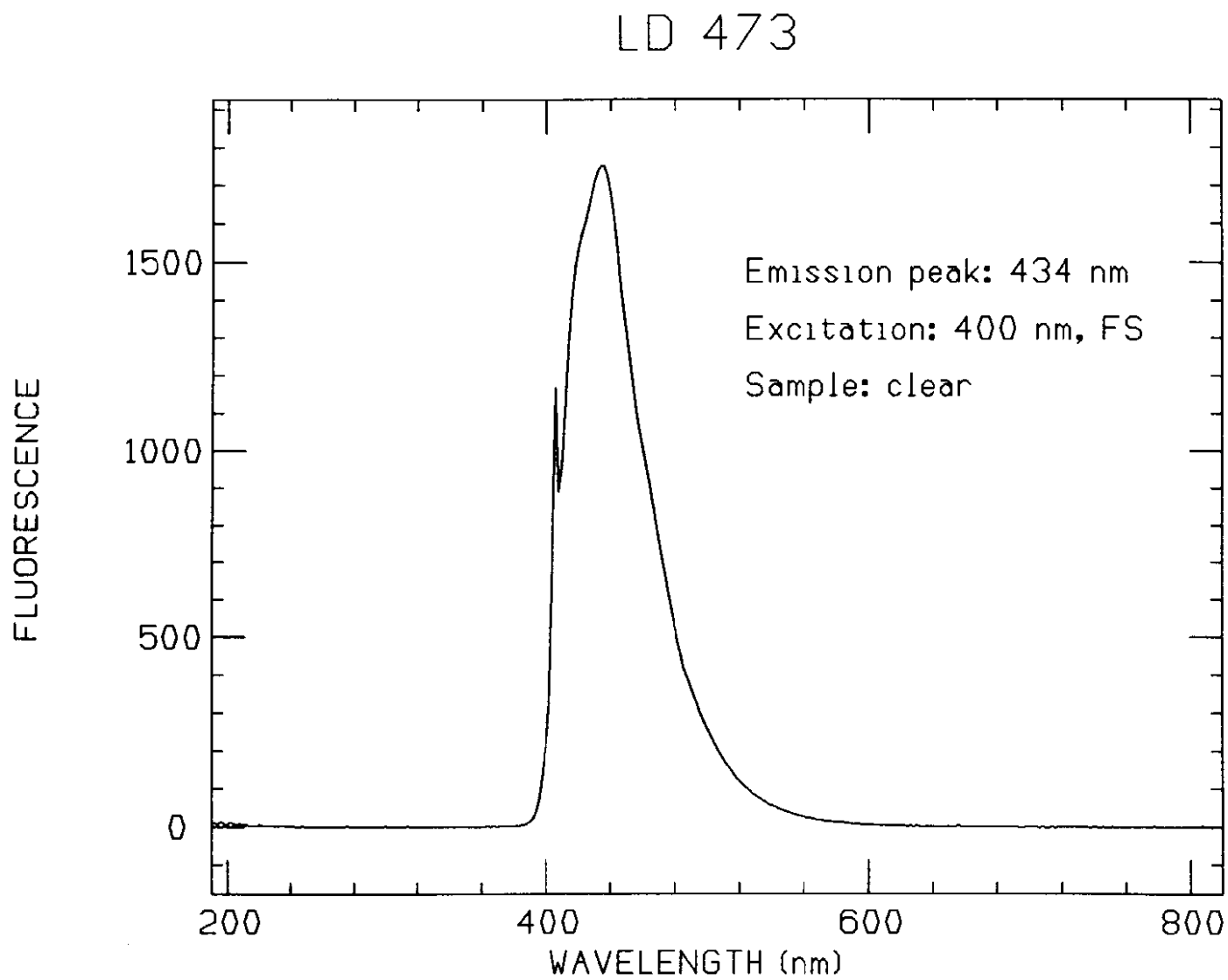

LD423
Emission peak: 398 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

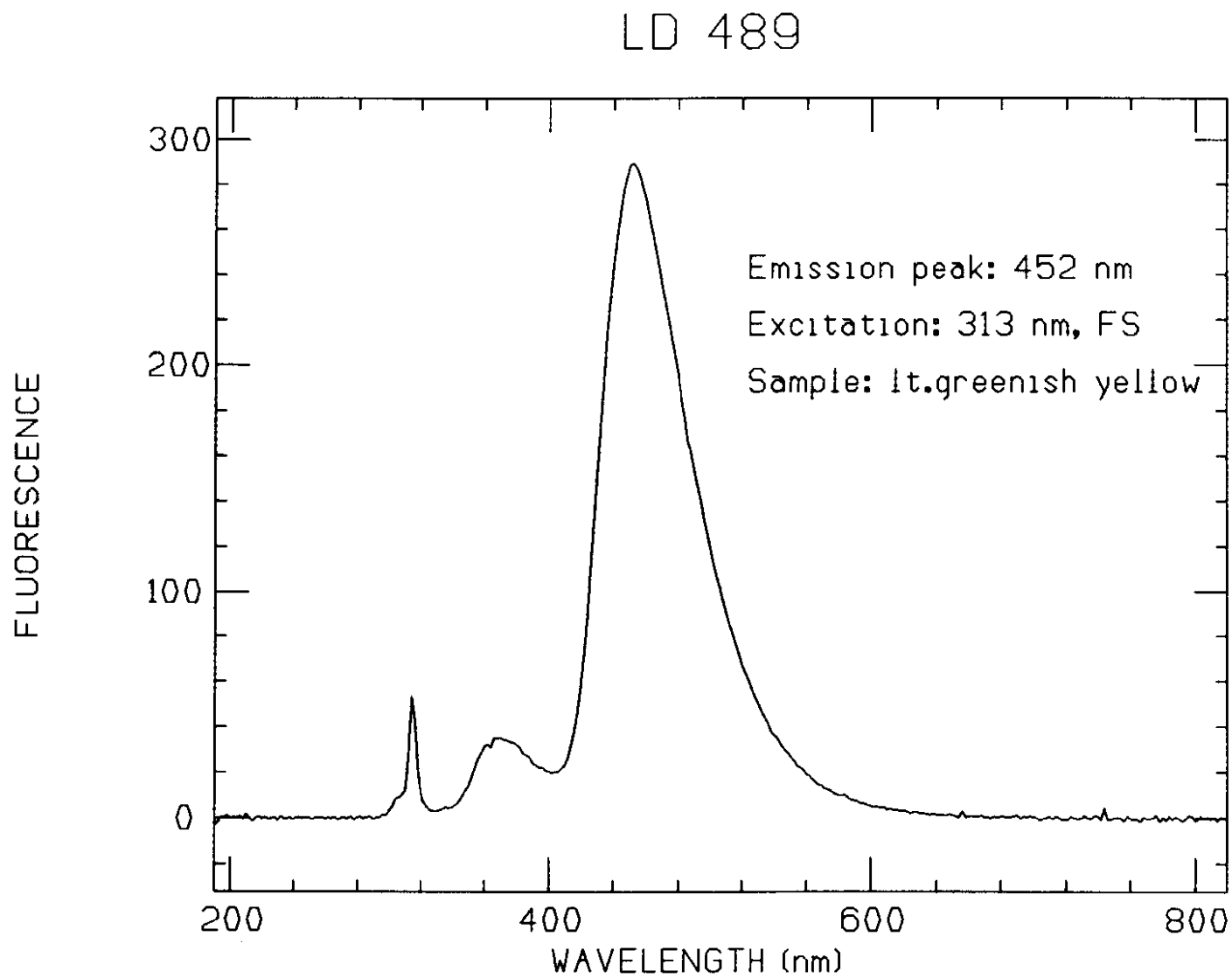

LD 423
Emission peak: 392 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1000
750
500
250
0
200
400
600
800
WAVELENGTH (nm)

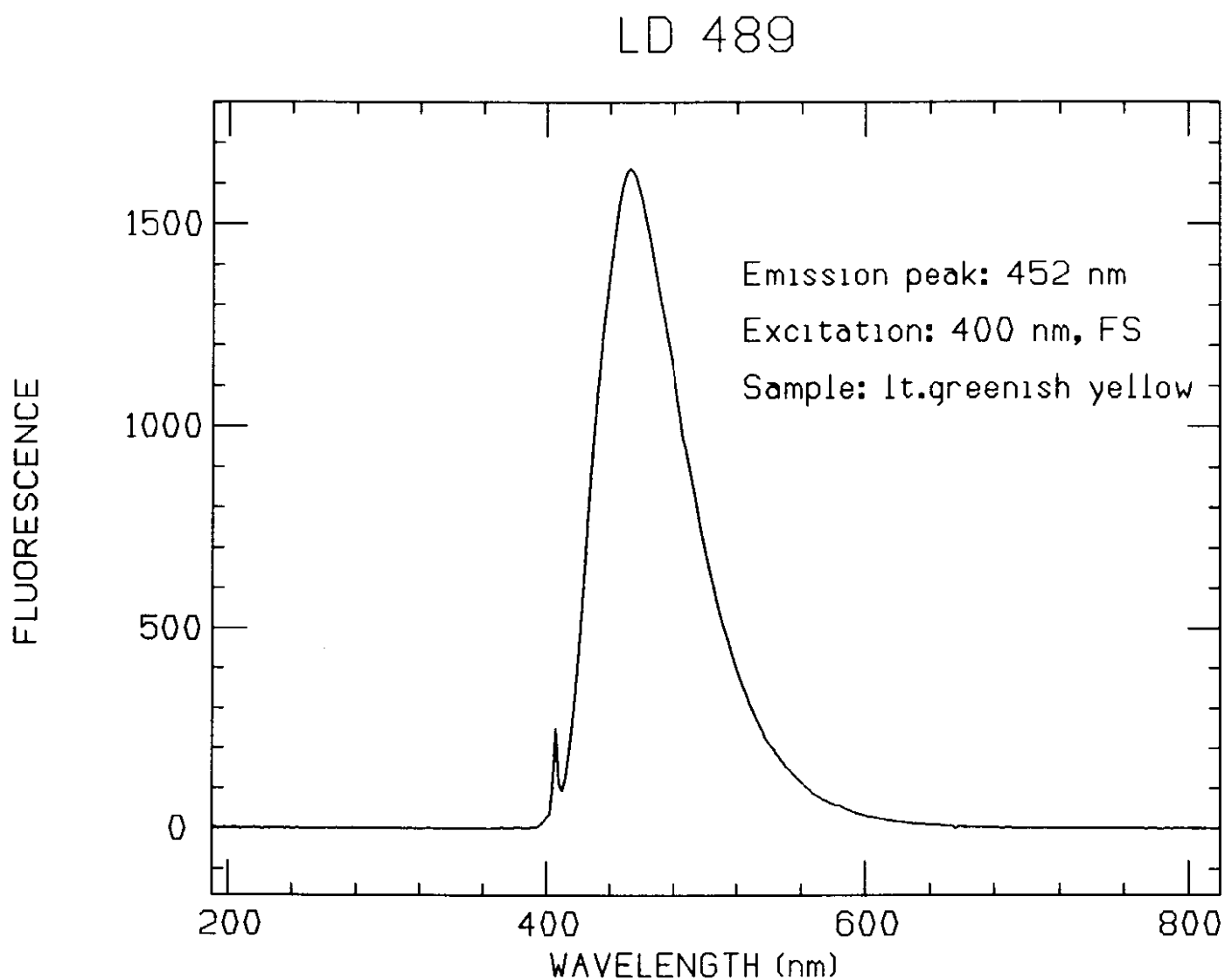

LD 425
Emission peak: 404 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
0
200
400
600
200
400
600
800
WAVELENGTH (nm)

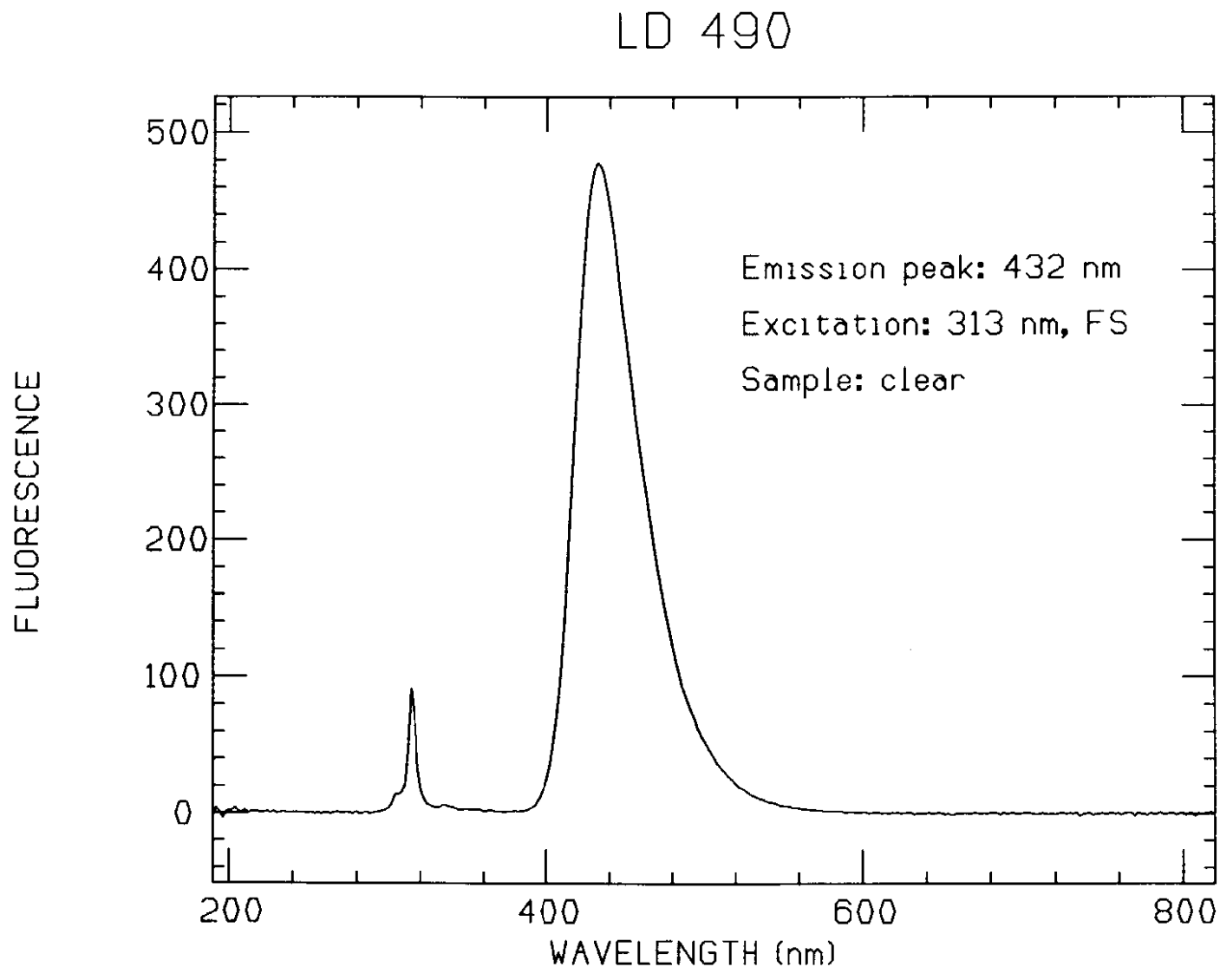

LD 425
Emission peak: 404 nm
Excitation: 360 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

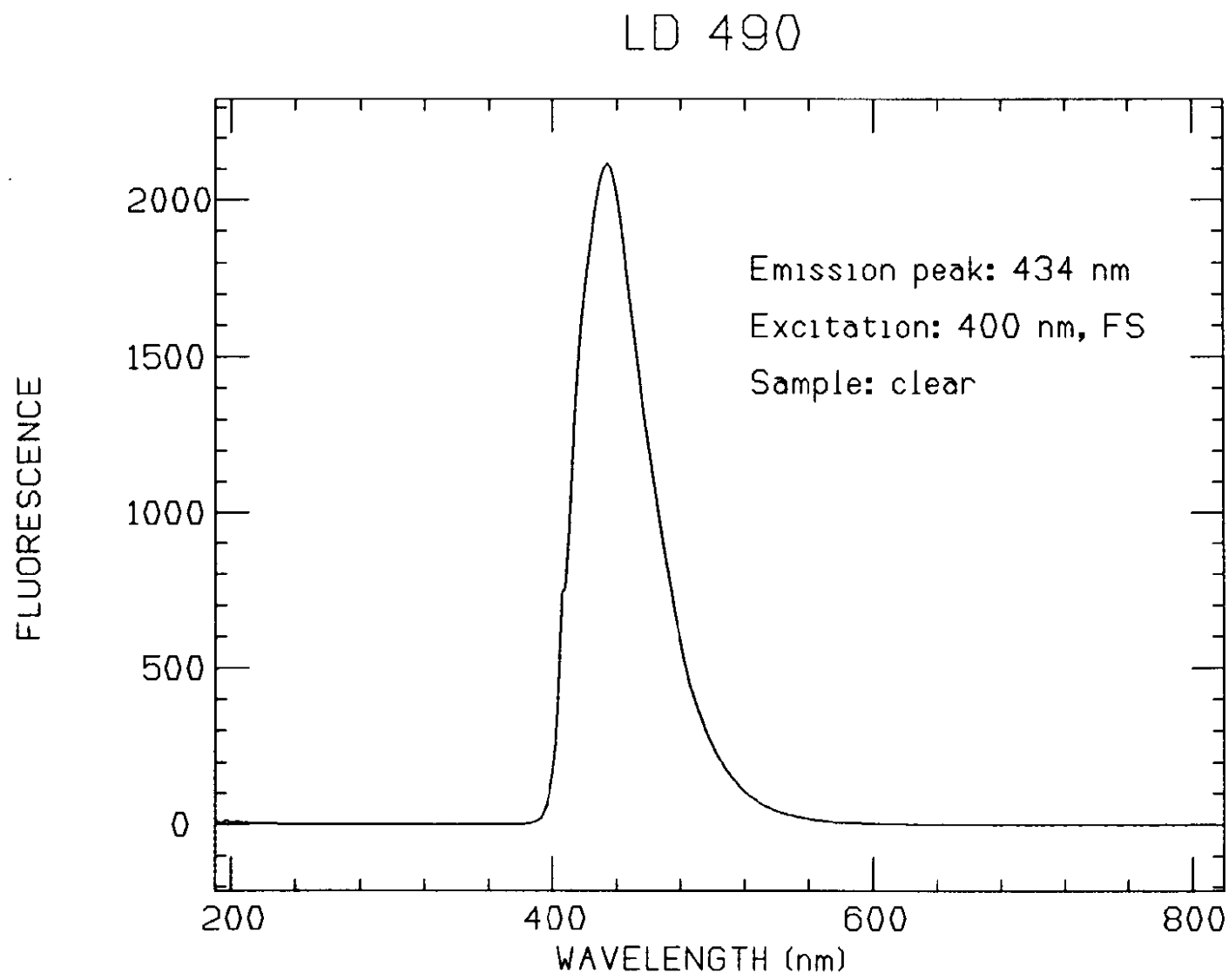

LD 473
Emission peak: 432 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
500
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

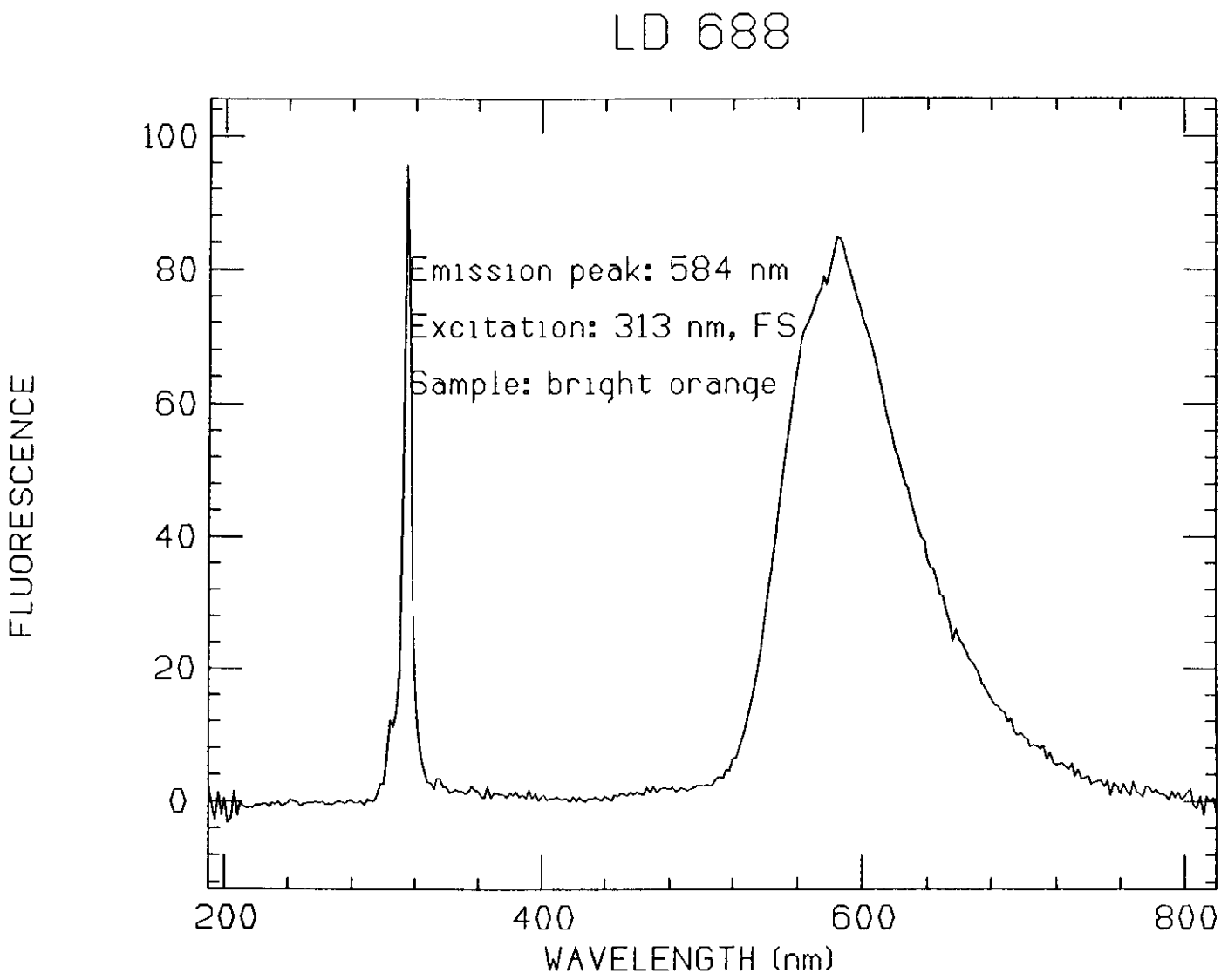

LD 473
Emission peak: 434 nm
Excitation: 400 nm, FS
Sample: clear
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)


LD 489
Emission peak: 452 nm
Excitation: 313 nm, FS
Sample: lt.greenish yellow
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

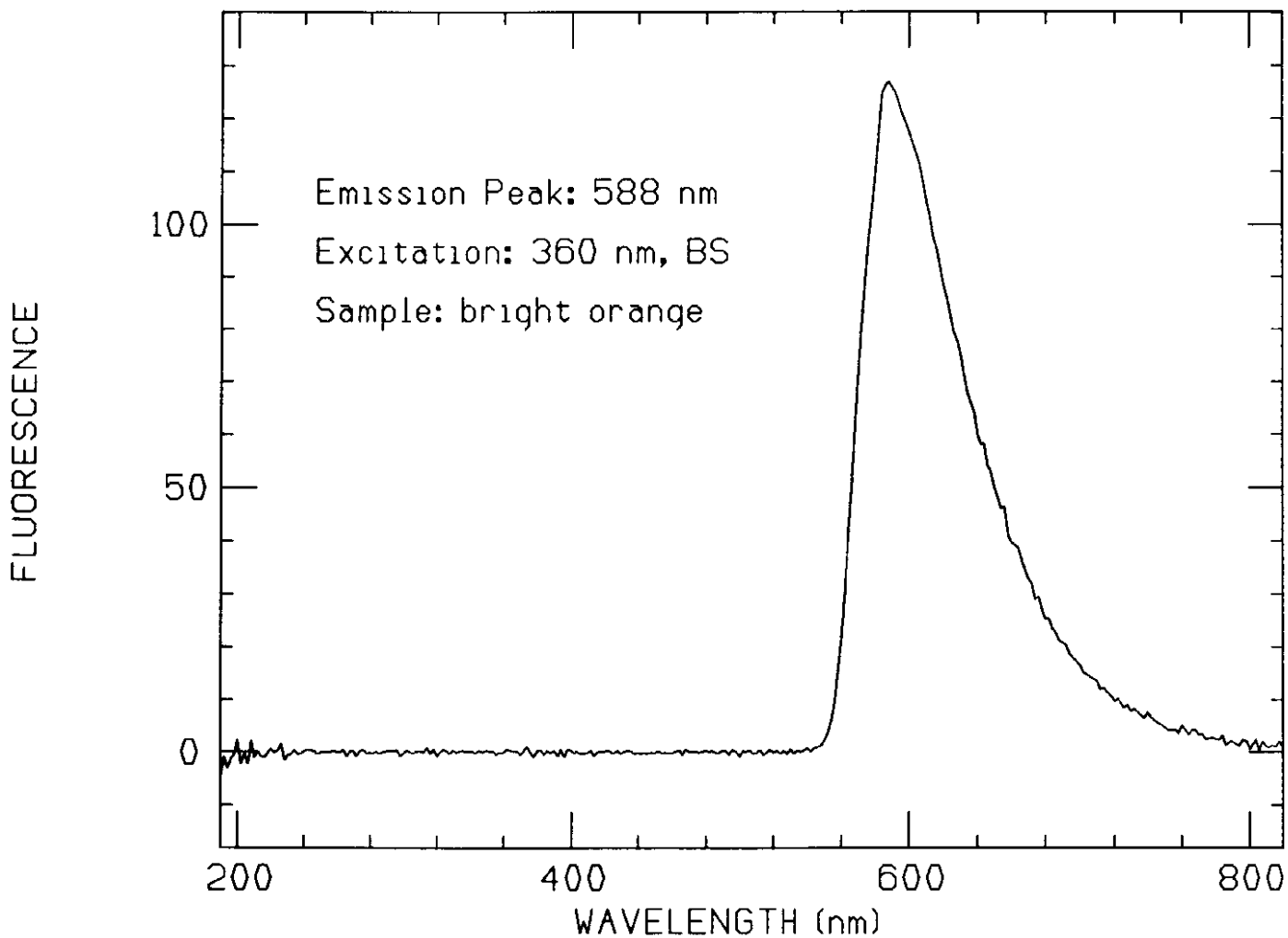

LD 489
Emission peak: 452 nm
Excitation: 400 nm, FS
Sample: lt.greenish yellow
FLUORESCENCE
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

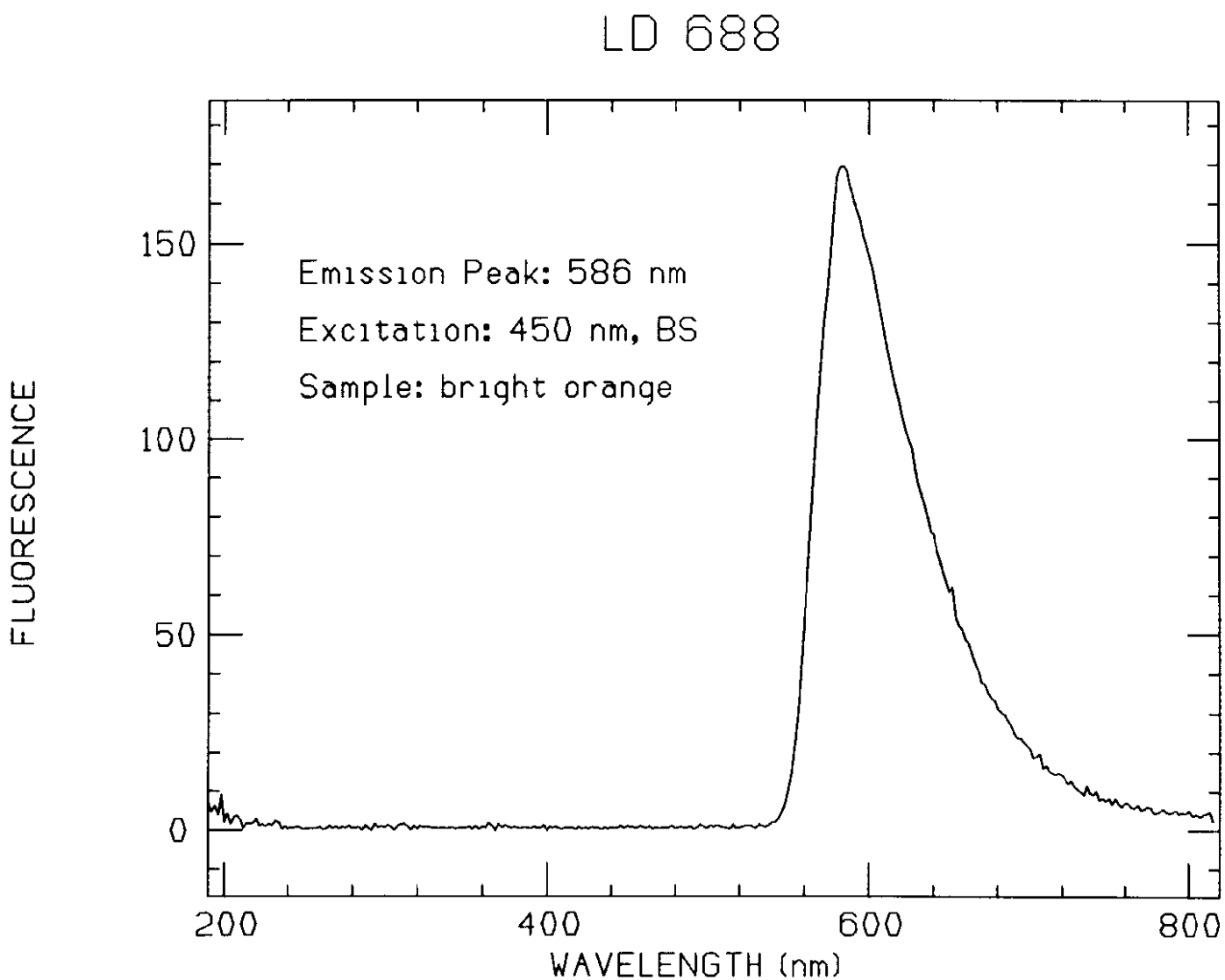

LD 490
Emission peak: 432 nm
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
500
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)

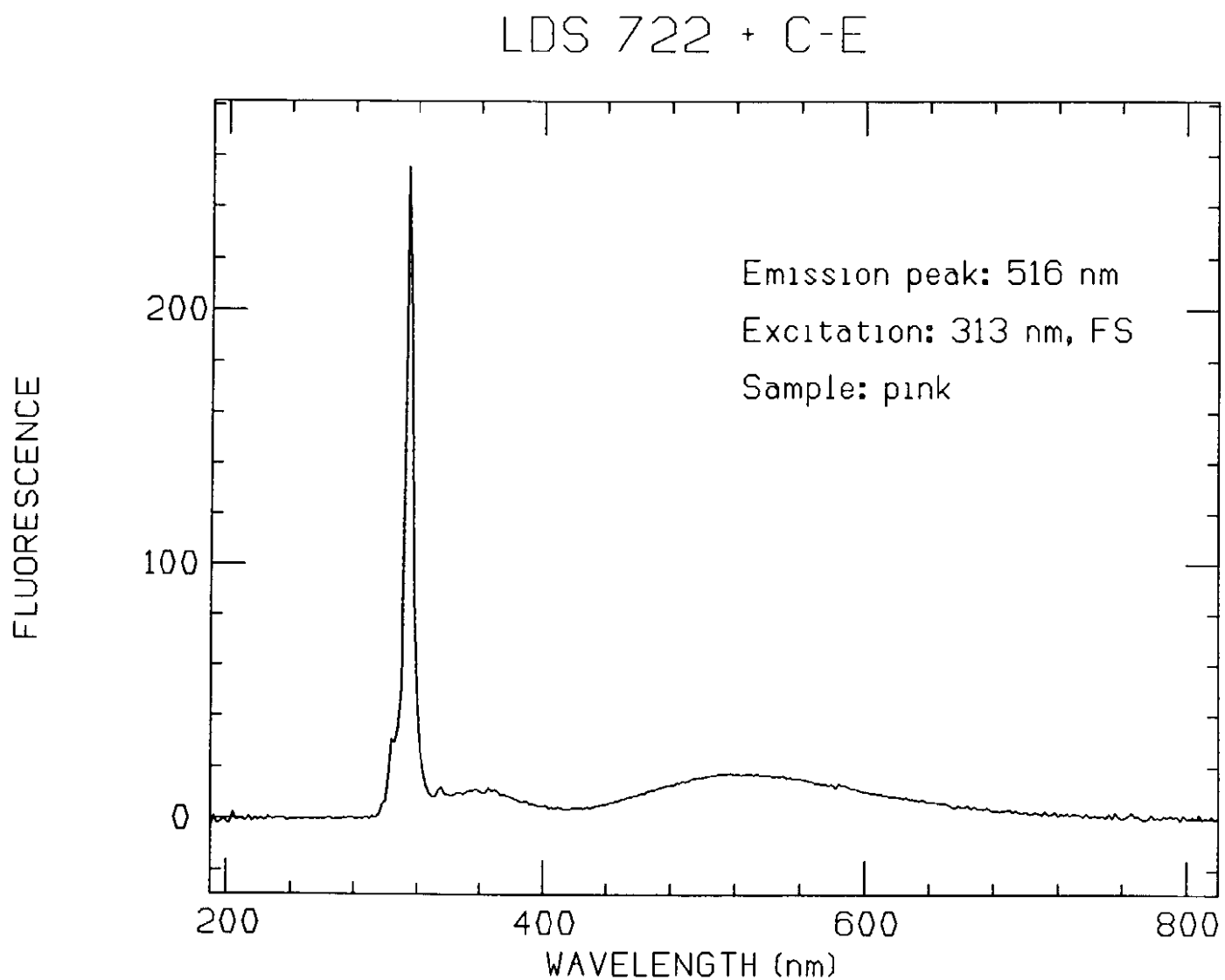

LD 490
Emission peak: 434 nm
Excitation: 400 nm, FS
Sample: clear
FLUORESCENCE
2000
1500
1000
500
0
200
400
600
800
WAVELENGTH (nm)

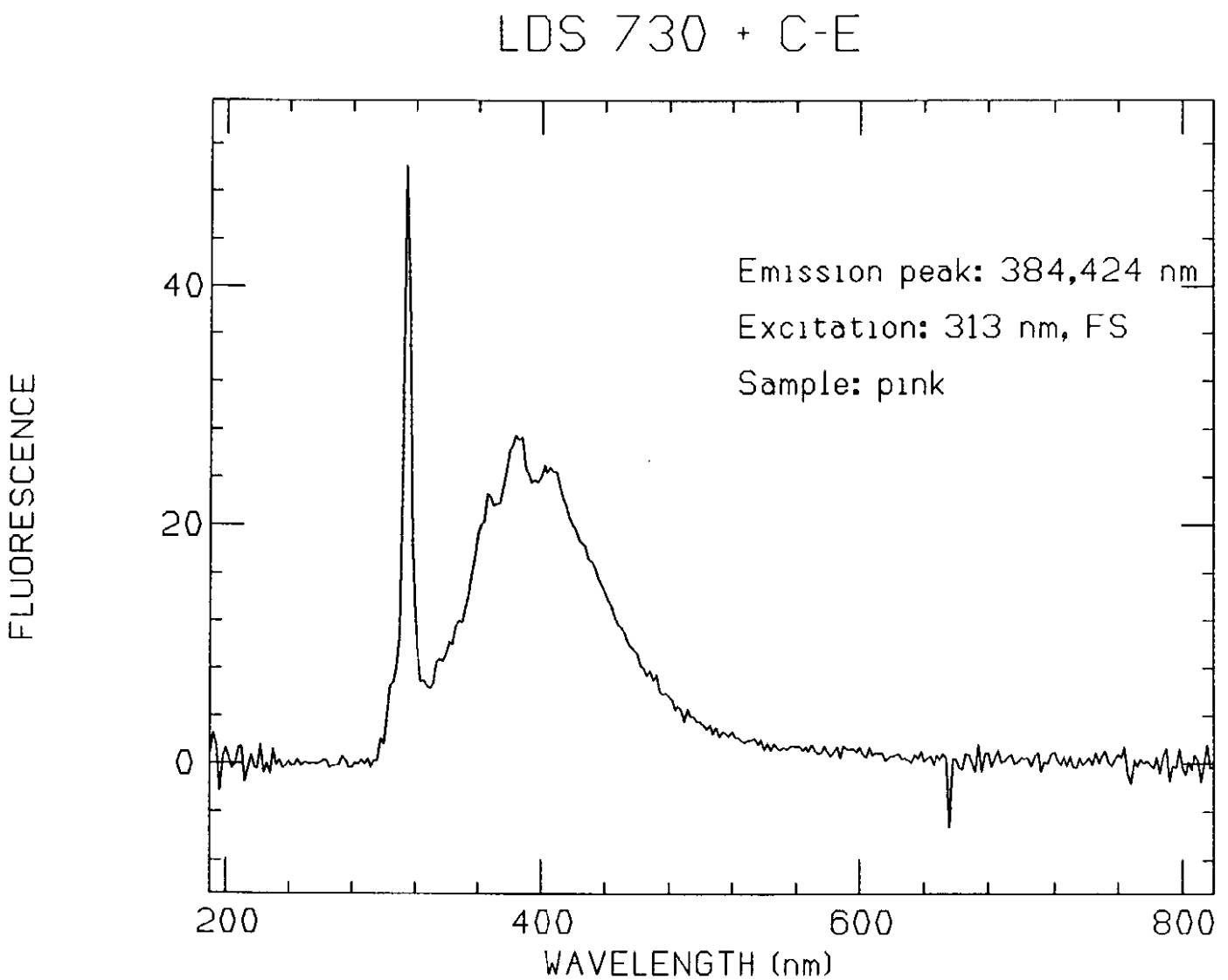

LD 688
Emission peak: 584 nm
Excitation: 313 nm, FS
Sample: bright orange
FLUORESCENCE
100
80
60
40
20
0
200
400
600
800
WAVELENGTH (nm)

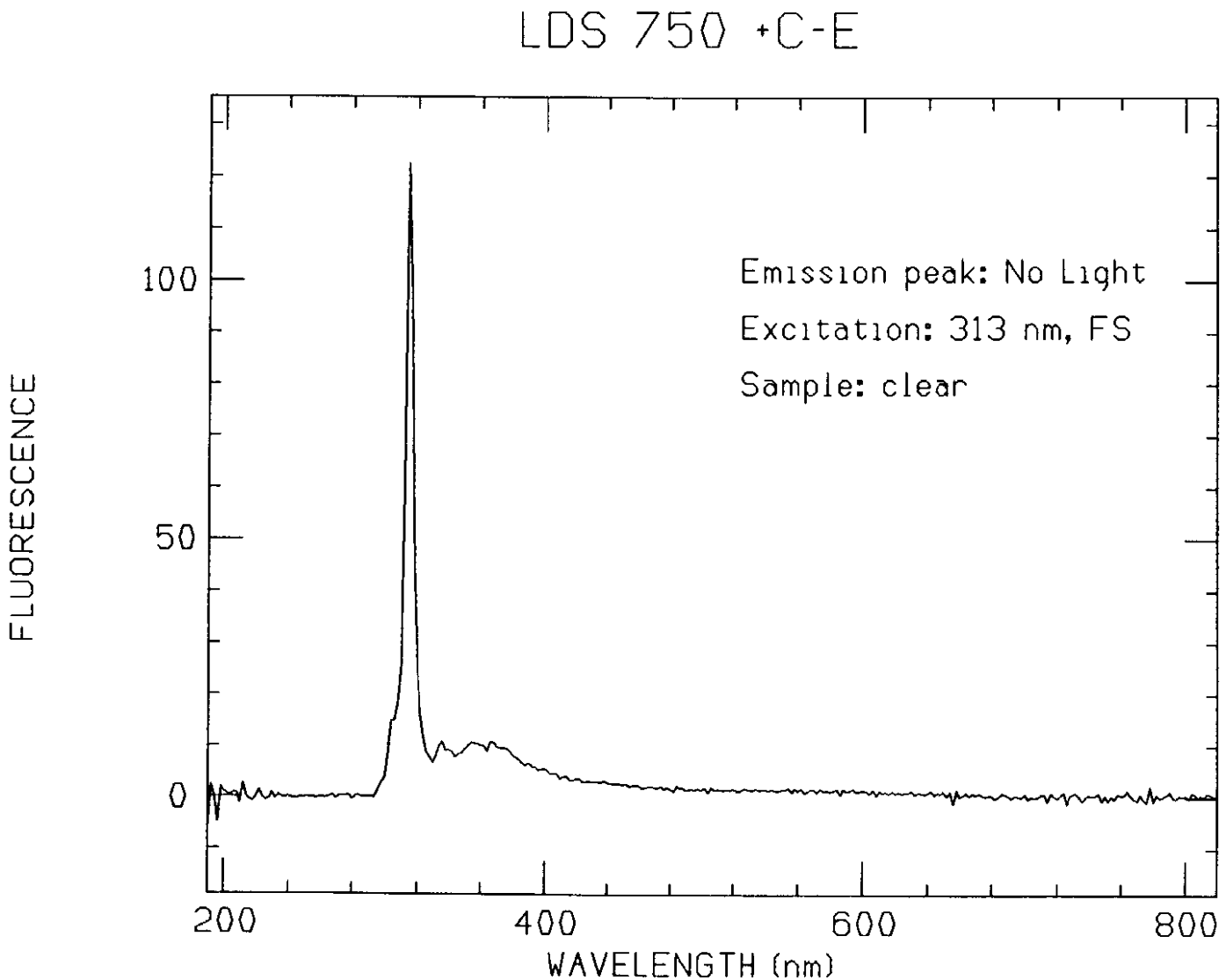
LD 688

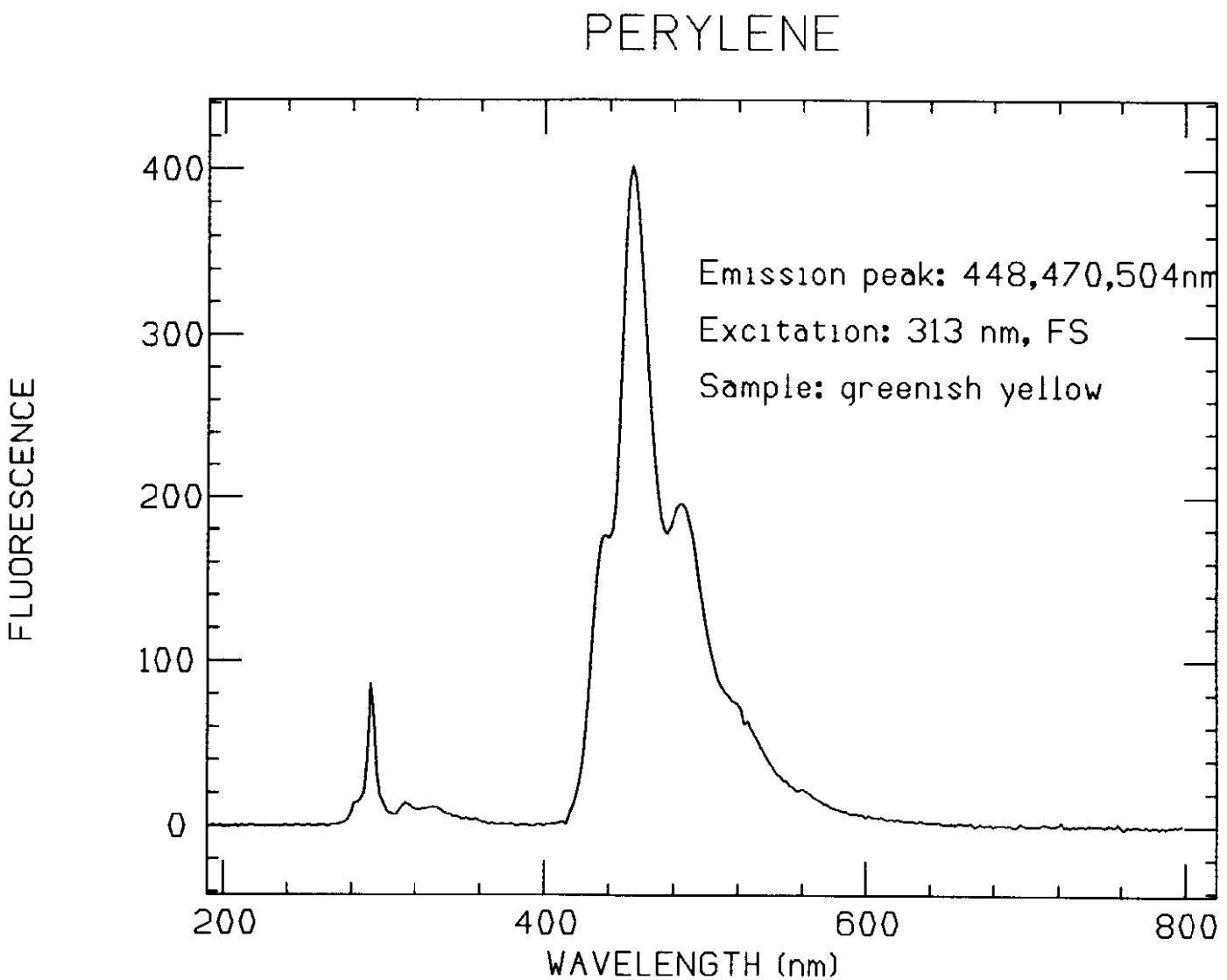

Emission Peak: 588 nm
Excitation: 360 nm, BS
Sample: bright orange
FLUORESCENCE
100
50
0
200
400
600
800
WAVELENGTH (nm)

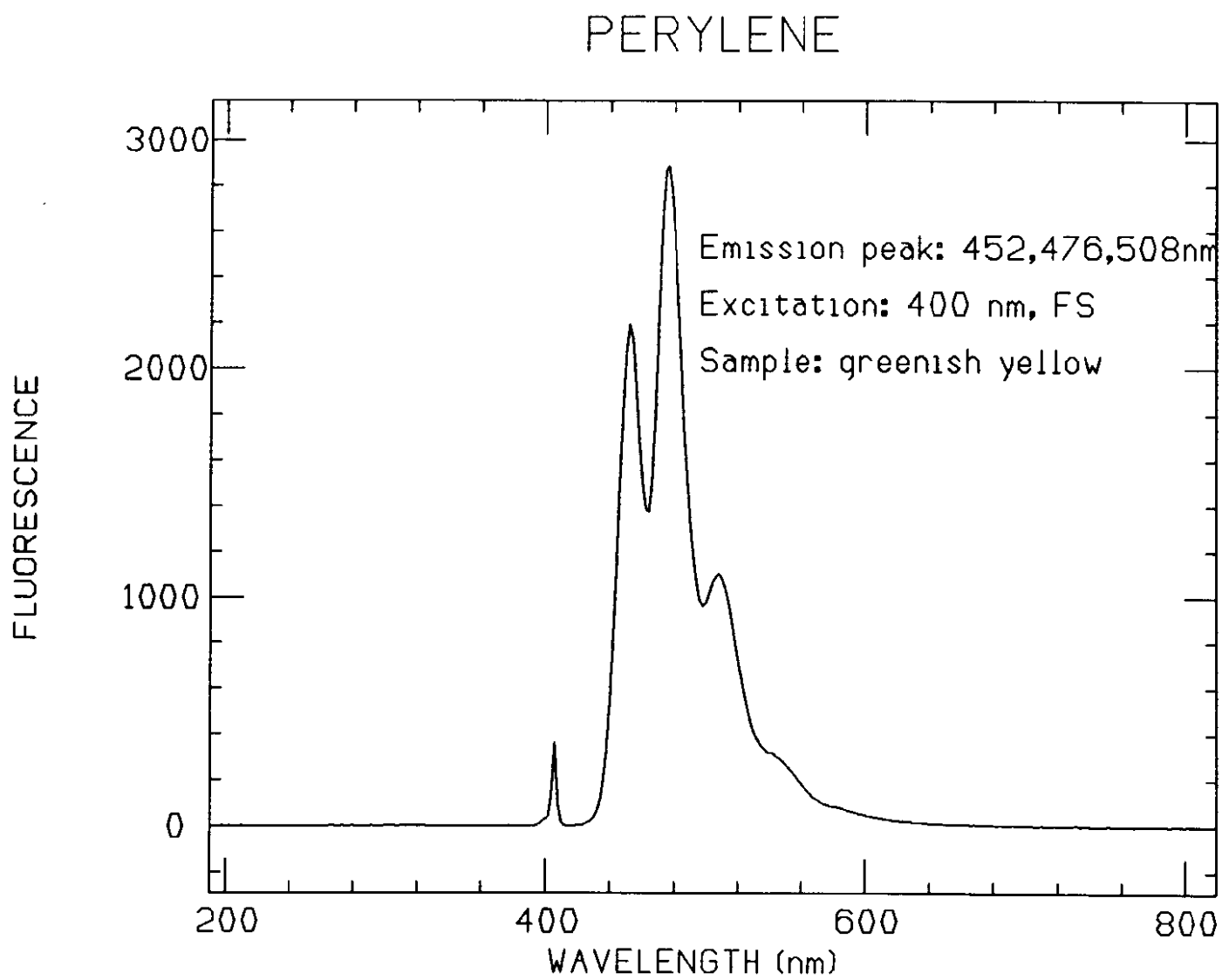

LD 688
Emission Peak: 586 nm
Excitation: 450 nm, BS
Sample: bright orange
FLUORESCENCE
150
100
50
0
200
400
600
800
WAVELENGTH (nm)

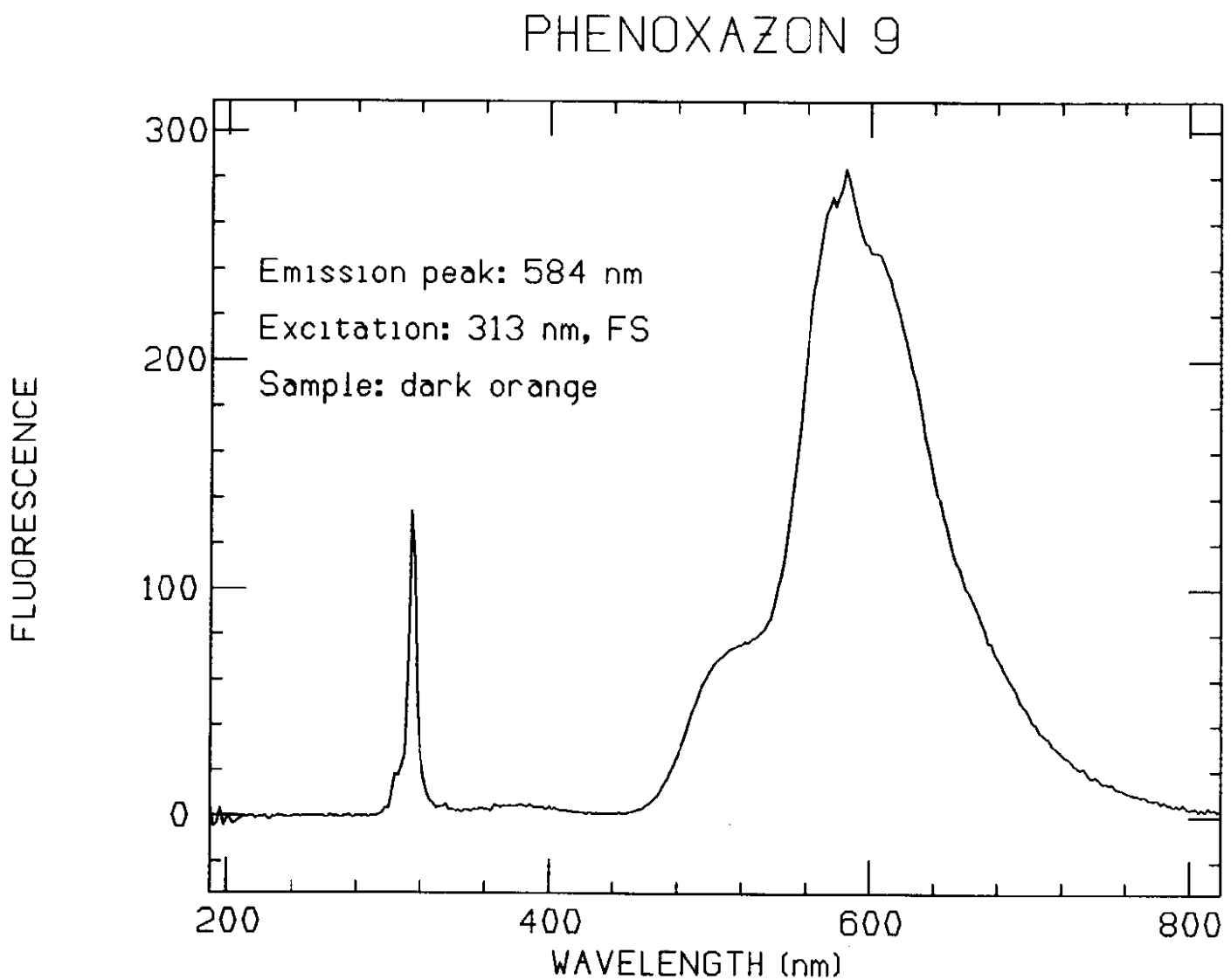

LDS 722 + C-E
Emission peak: 516 nm
Excitation: 313 nm, FS
Sample: pink
FLUORESCENCE
0
100
200
200
400
600
800
WAVELENGTH (nm)

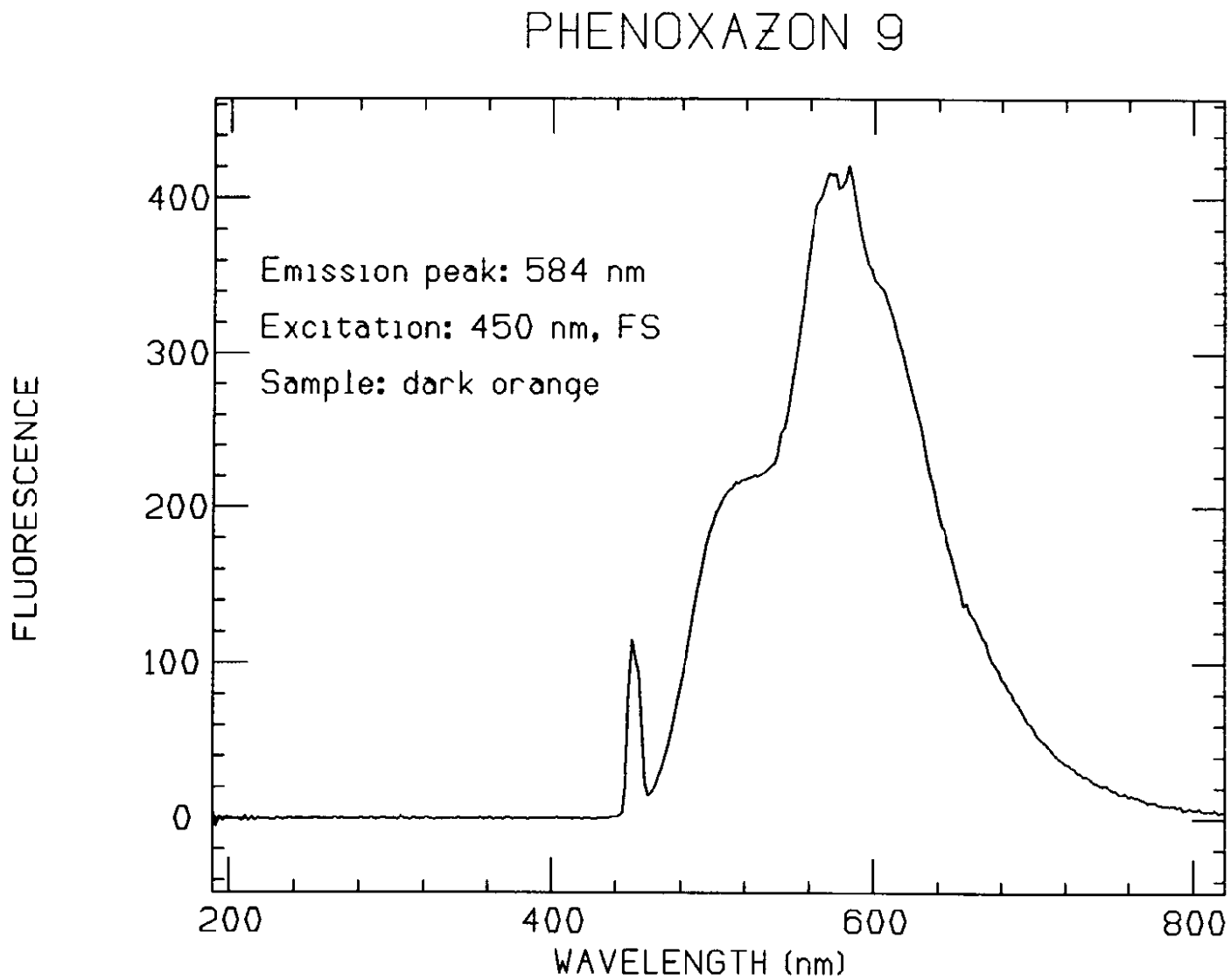

LDS 730 + C-E
Emission peak: 384,424 nm
Excitation: 313 nm, FS
Sample: pink
FLUORESCENCE
0
20
40
200
400
600
800
WAVELENGTH (nm)

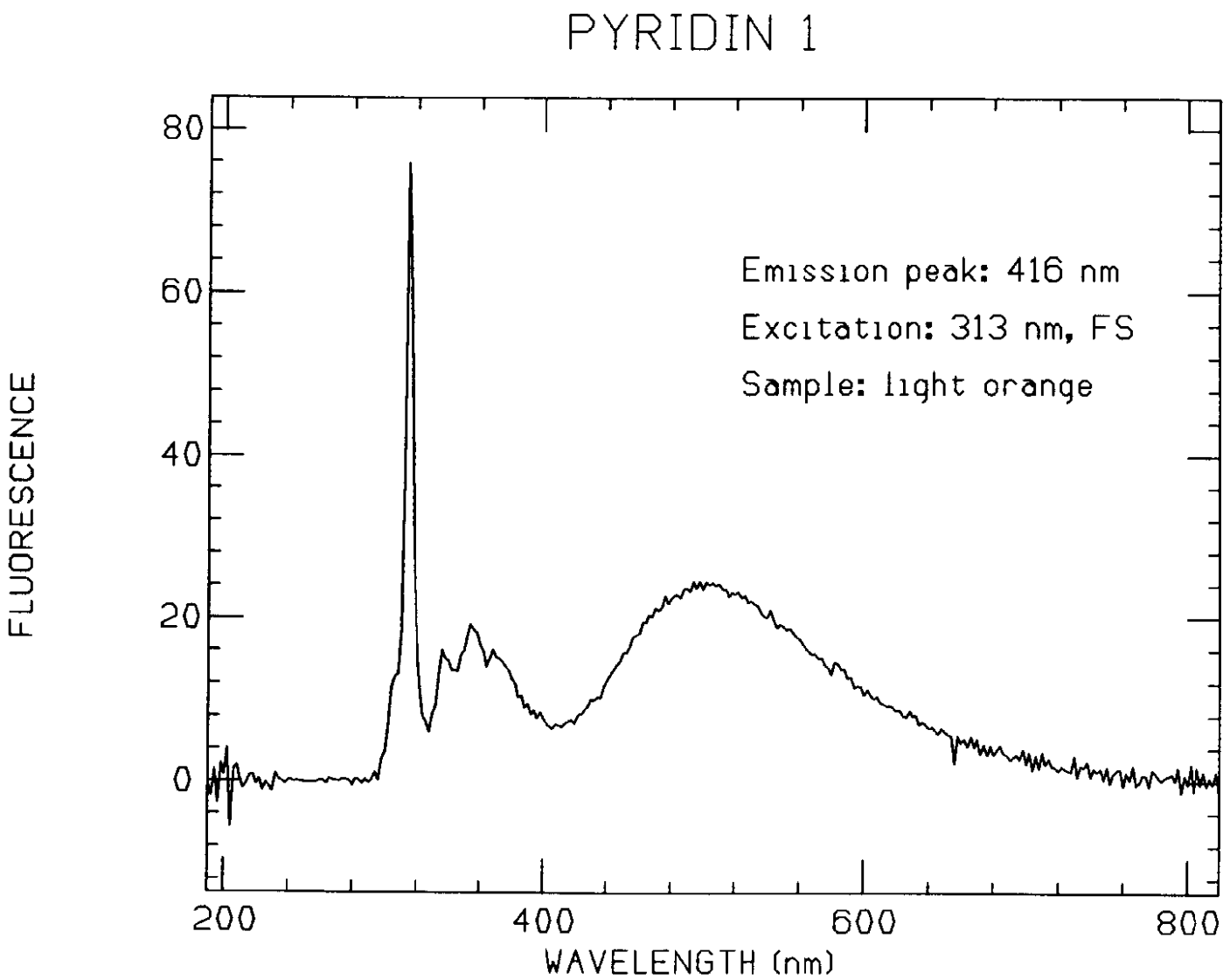

LDS 750 +C-E
Emission peak: No Light
Excitation: 313 nm, FS
Sample: clear
FLUORESCENCE
100
50
0
200
400
600
800
WAVELENGTH (nm)


PERYLENE
Emission peak: 448,470,504nm
Excitation: 313 nm, FS
Sample: greenish yellow
FLUORESCENCE
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)


PERYLENE
Emission peak: 452,476,508nm
Excitation: 400 nm, FS
Sample: greenish yellow
FLUORESCENCE
3000
2000
1000
0
200
400
600
800
WAVELENGTH (nm)


PHENOXAZON 9
Emission peak: 584 nm
Excitation: 313 nm, FS
Sample: dark orange
FLUORESCENCE
300
200
100
0
200
400
600
800
WAVELENGTH (nm)


PHENOXAZON 9
Emission peak: 584 nm
Excitation: 450 nm, FS
Sample: dark orange
FLUORESCENCE
400
300
200
100
0
200
400
600
800
WAVELENGTH (nm)


PYRIDIN 1
Emission peak: 416 nm
Excitation: 313 nm, FS
Sample: light orange
FLUORESCENCE
80
60
40
20
0
200
400
600
800
WAVELENGTH (nm)