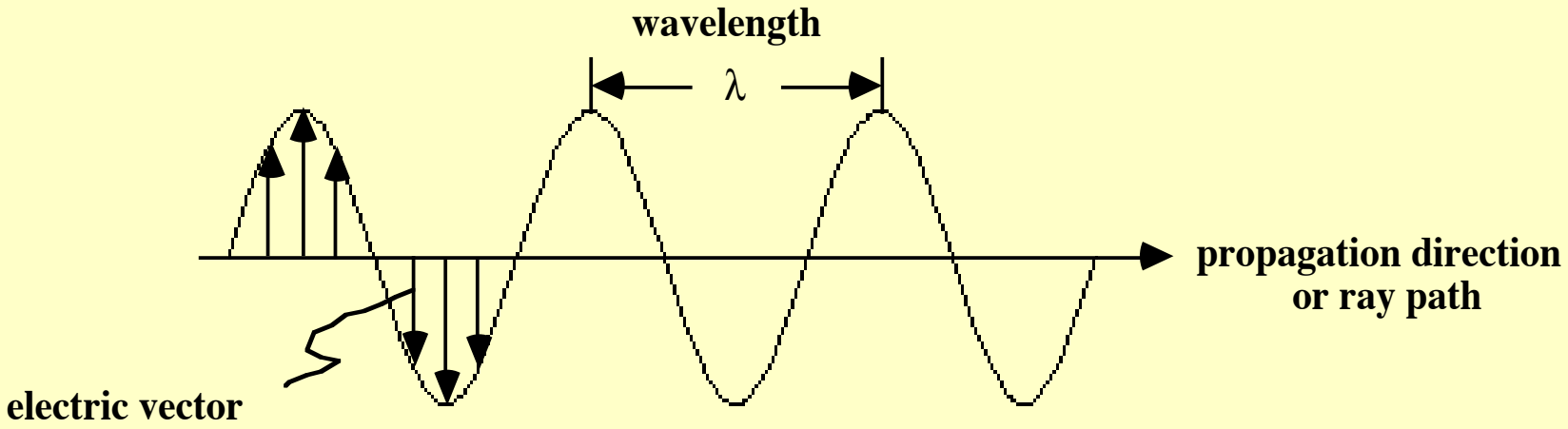
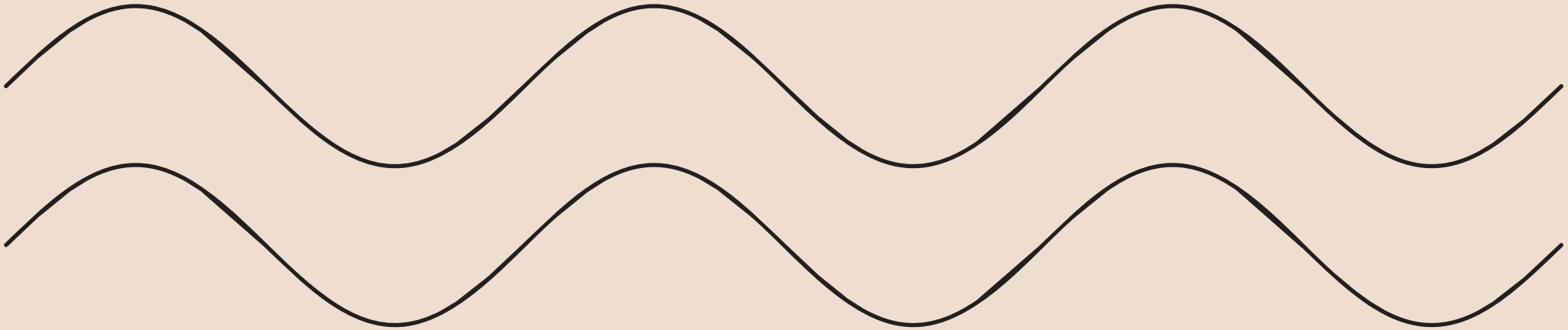
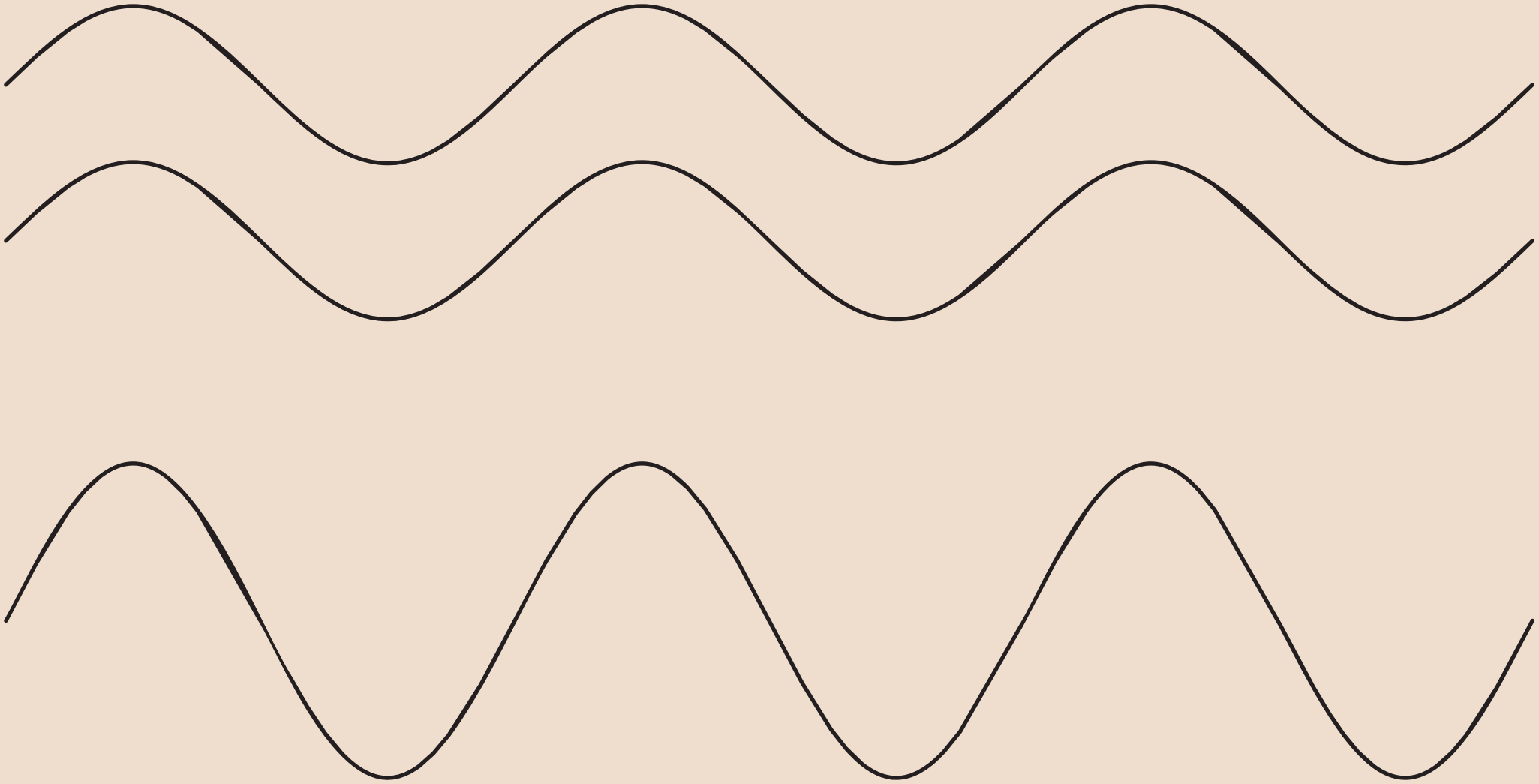
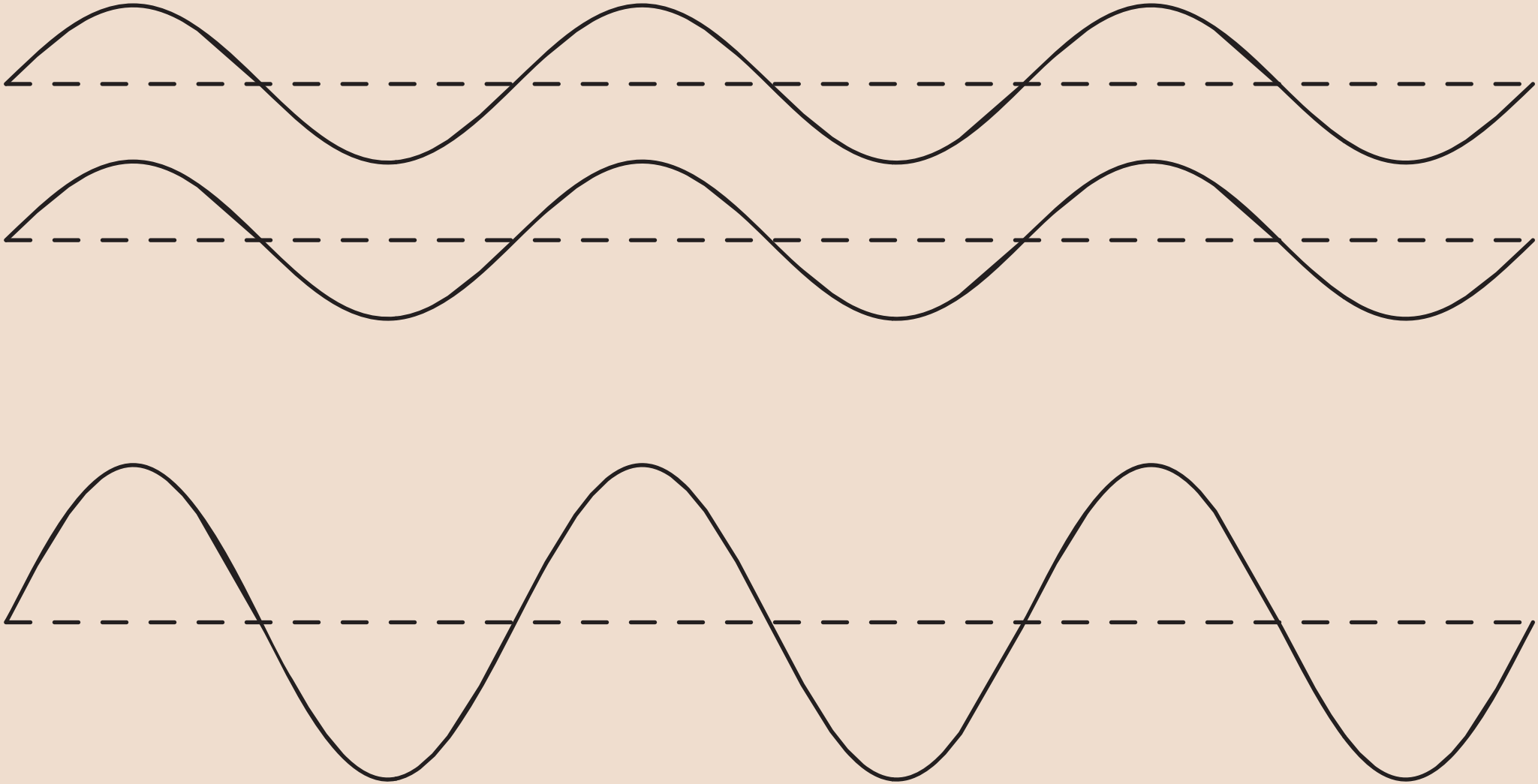
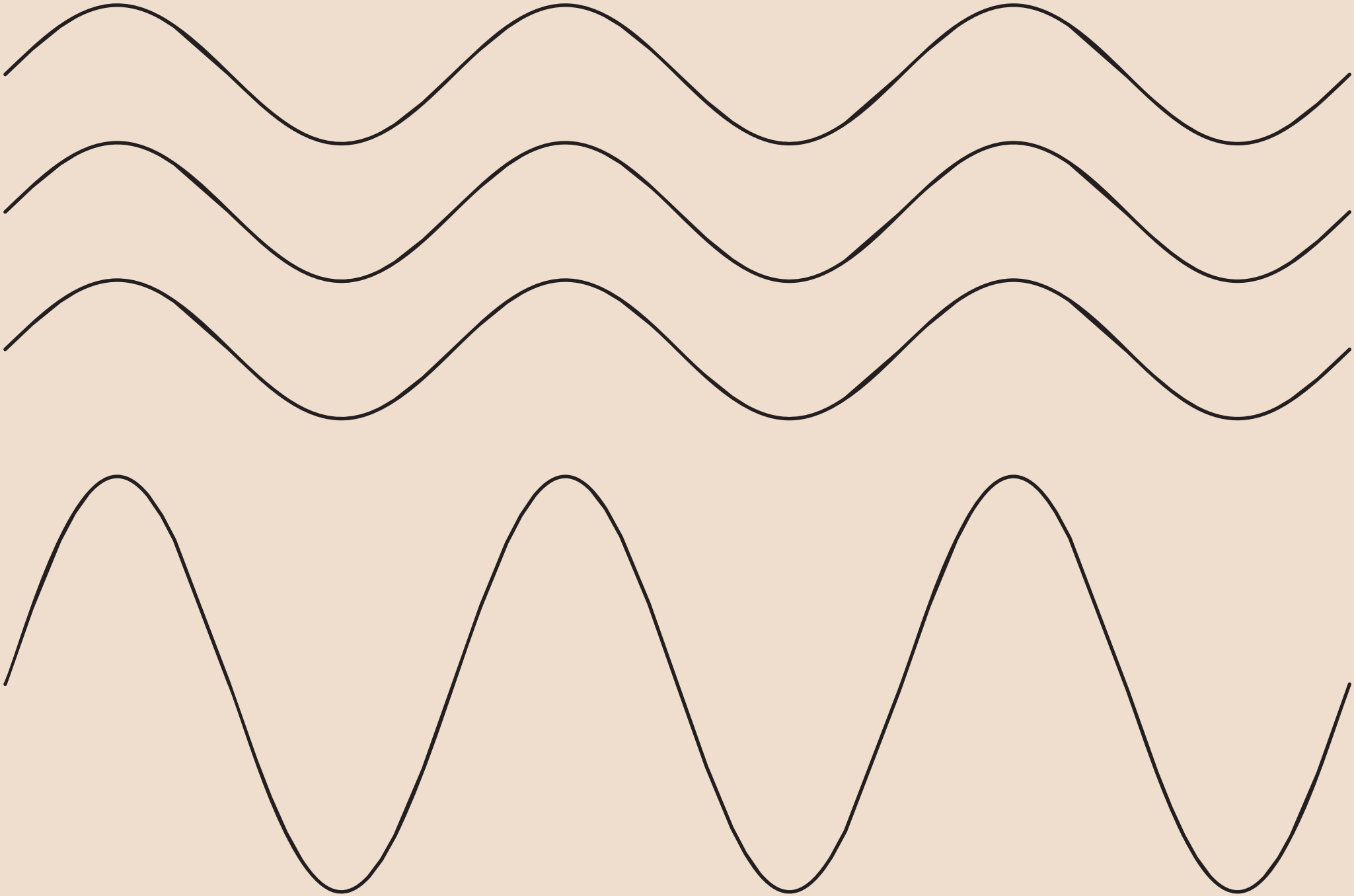
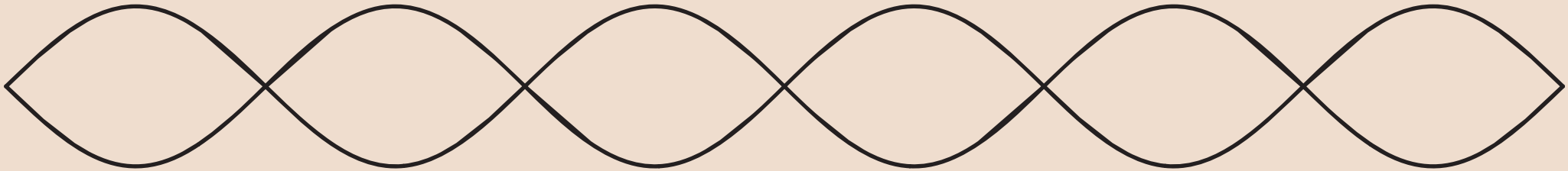

wavelength
λ
propagation direction
or ray path
electric vector

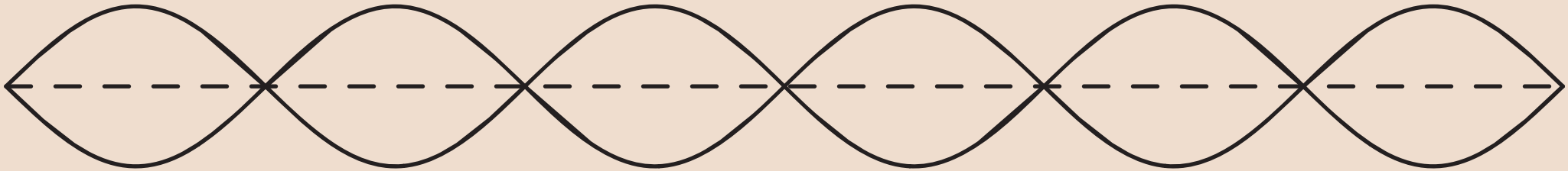


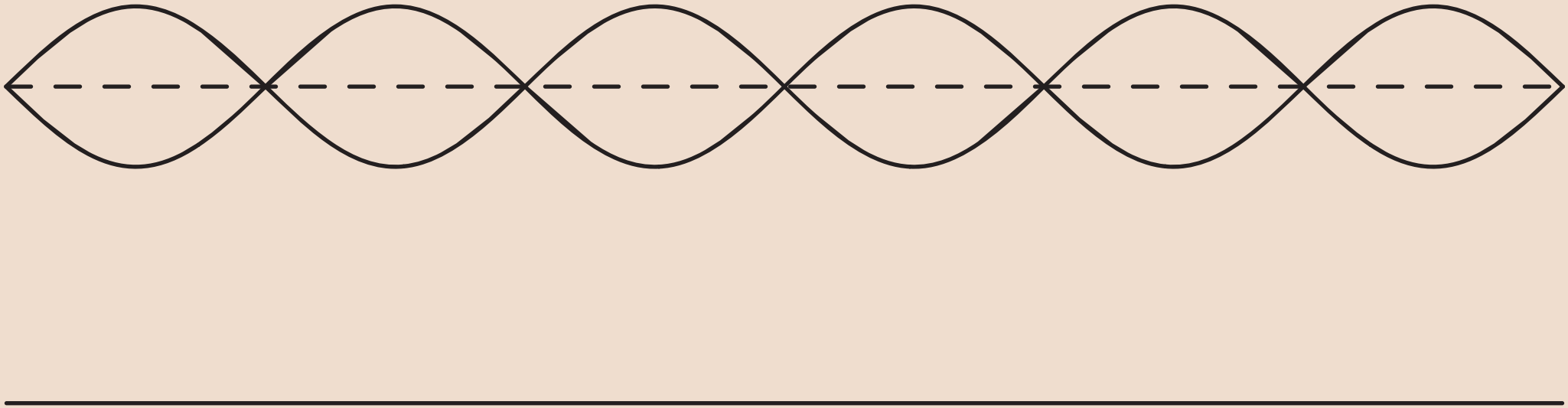






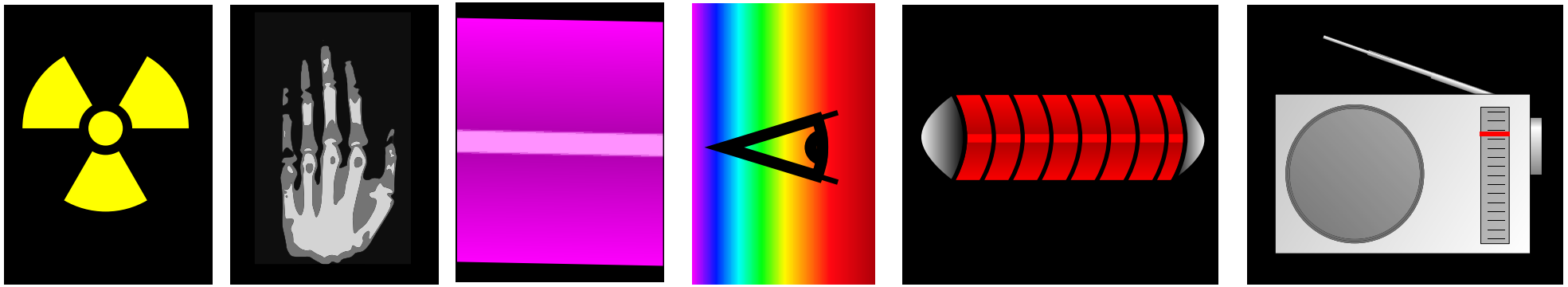






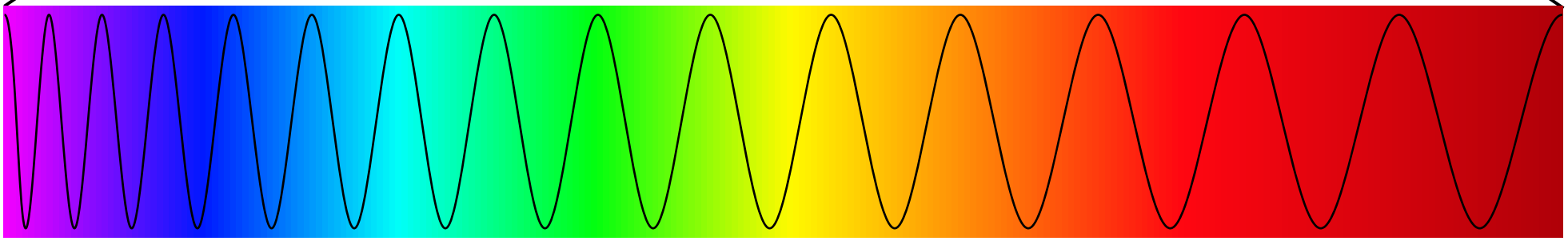
$$v = \lambda f$$

$$(ms^{-1}) = (m)(s^{-1})$$



0.01nm 1nm 100nm 1mm 1cm 1m 1km

400nm 700nm



$$c = \lambda f$$

$$(ms^{-1}) = (m)(s^{-1})$$

$$3x10^{8} =$$

$$c = \lambda f$$

$$(ms^{-1}) = (m)(s^{-1})$$

$$3x10^{8} = (500x10^{-9})$$

$$c = \lambda f$$

$$(ms^{-1}) = (m)(s^{-1})$$

$$3x10^{8} = (500x10^{-9})(6x10^{14})$$

$$E = h f = h c/\lambda$$

$$E = h f = h c/\lambda$$

$$(J) = (J\ s)(s^{-1})$$

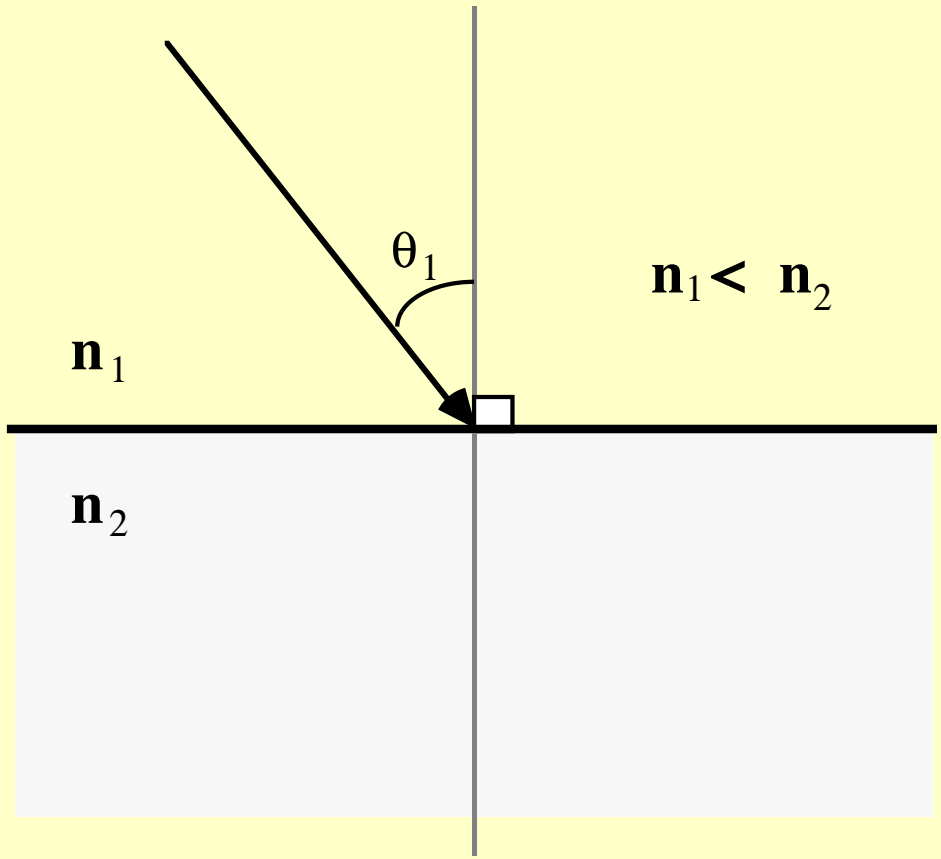
$$E = h f = h c/\lambda$$

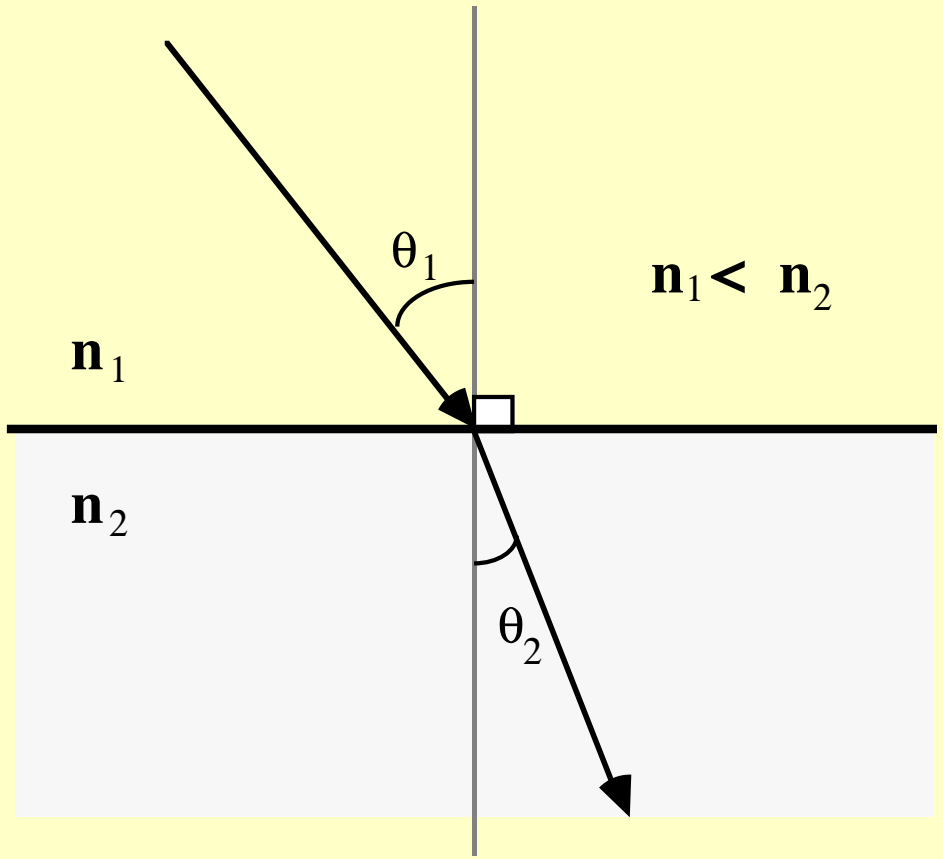
$$(J) = (J\ s)(s^{-1})$$

$$(h = 6.626 \times 10^{-34}\ J\ s)$$

$$(f = 6 \times 10^{14}\ s^{-1})$$

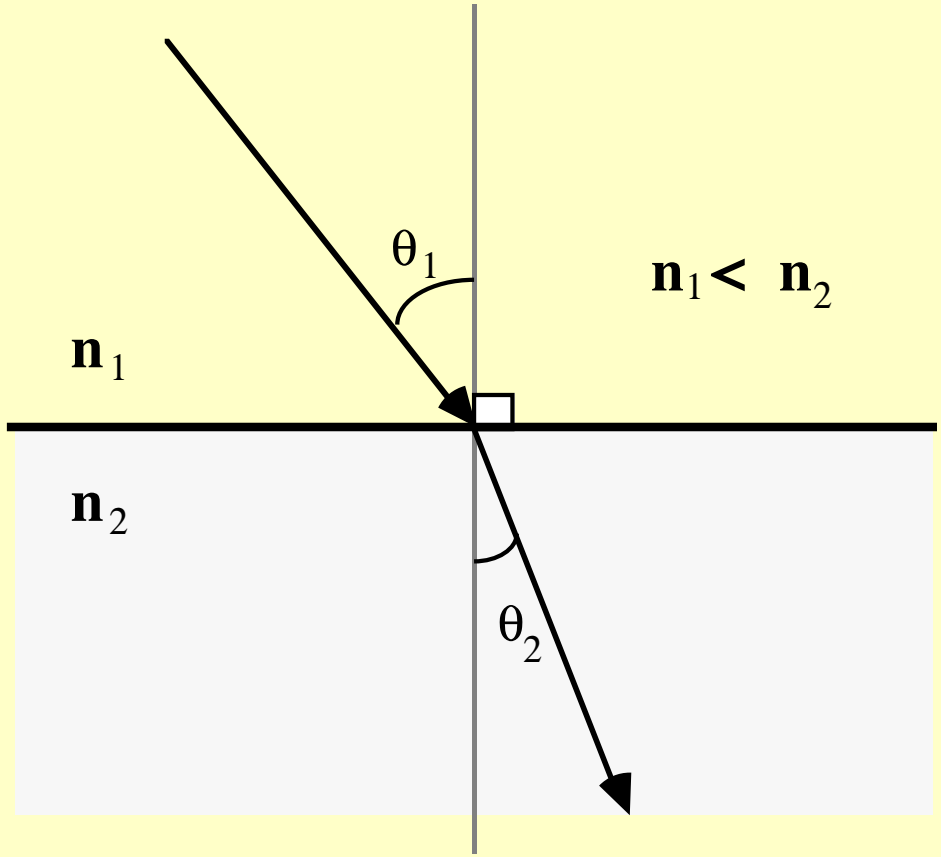
$$(E = 4 \times 10^{-19}\ J = 2.5\ eV)$$


θ1
n1 < n2
n1
n2


θ1
n1 < n2
n1
n2
θ2

Snell's Law

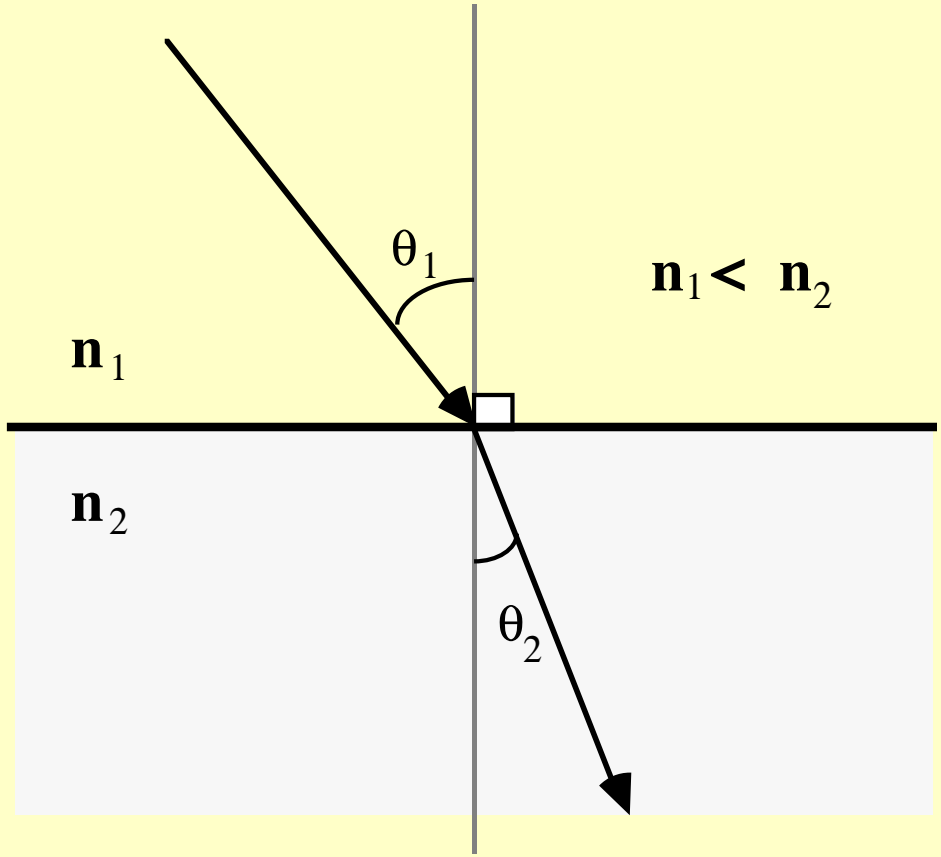
$$\frac{\sin\theta_1}{\sin\theta_2} = \frac{n_2}{n_1}$$

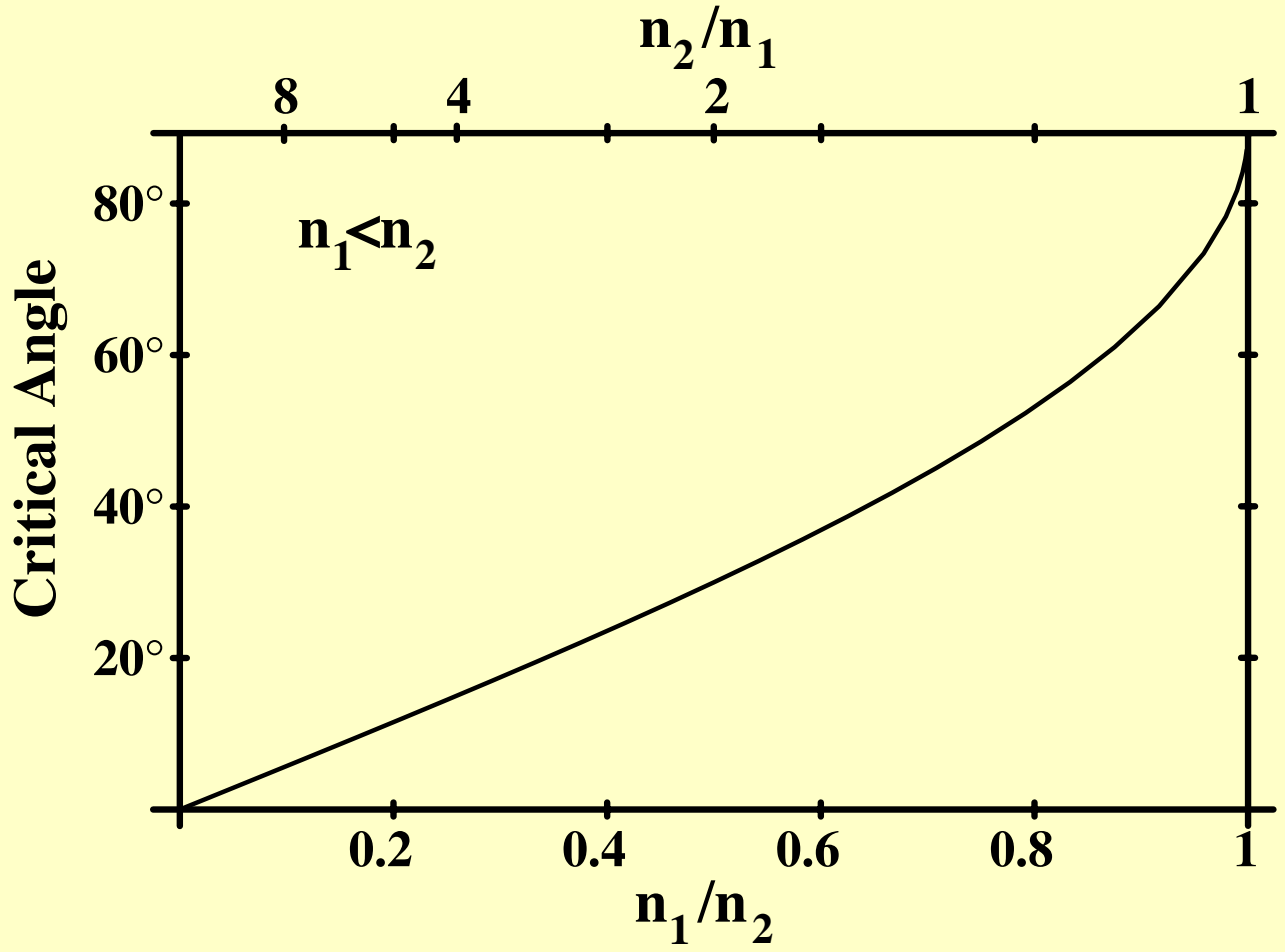


Snell's Law

$$\frac{\sin\theta_1}{\sin\theta_2} = \frac{n_2}{n_1}$$

$$n_1 \sin\theta_1 = n_2 \sin\theta_2$$

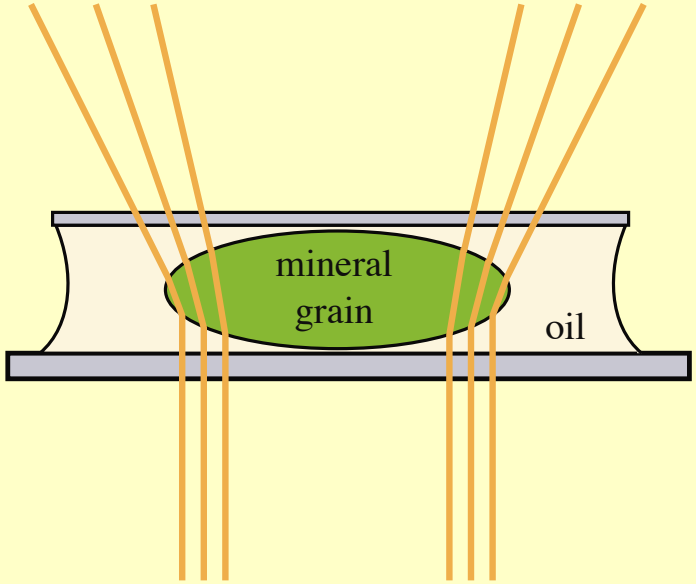




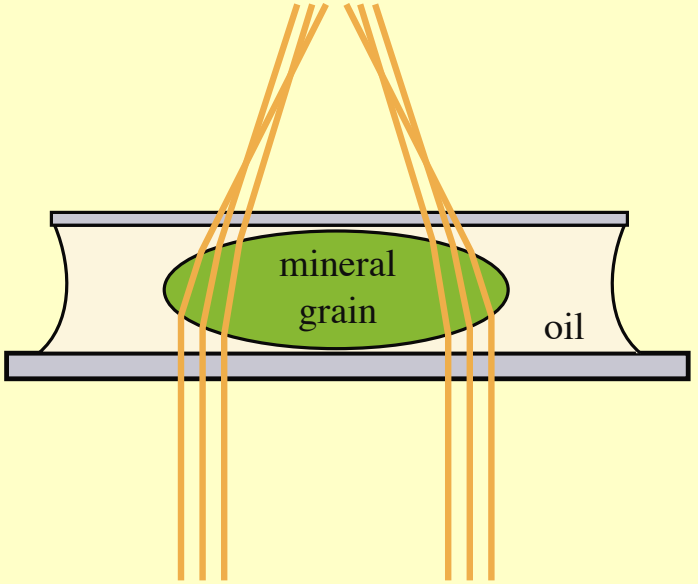
$$\text{Sin}\,\theta_1 = \text{Sin}\,\theta_2 \frac{n_2}{n_1}$$

$$1 = \text{Sin}\,\theta_2 \frac{n_2}{n_1}$$

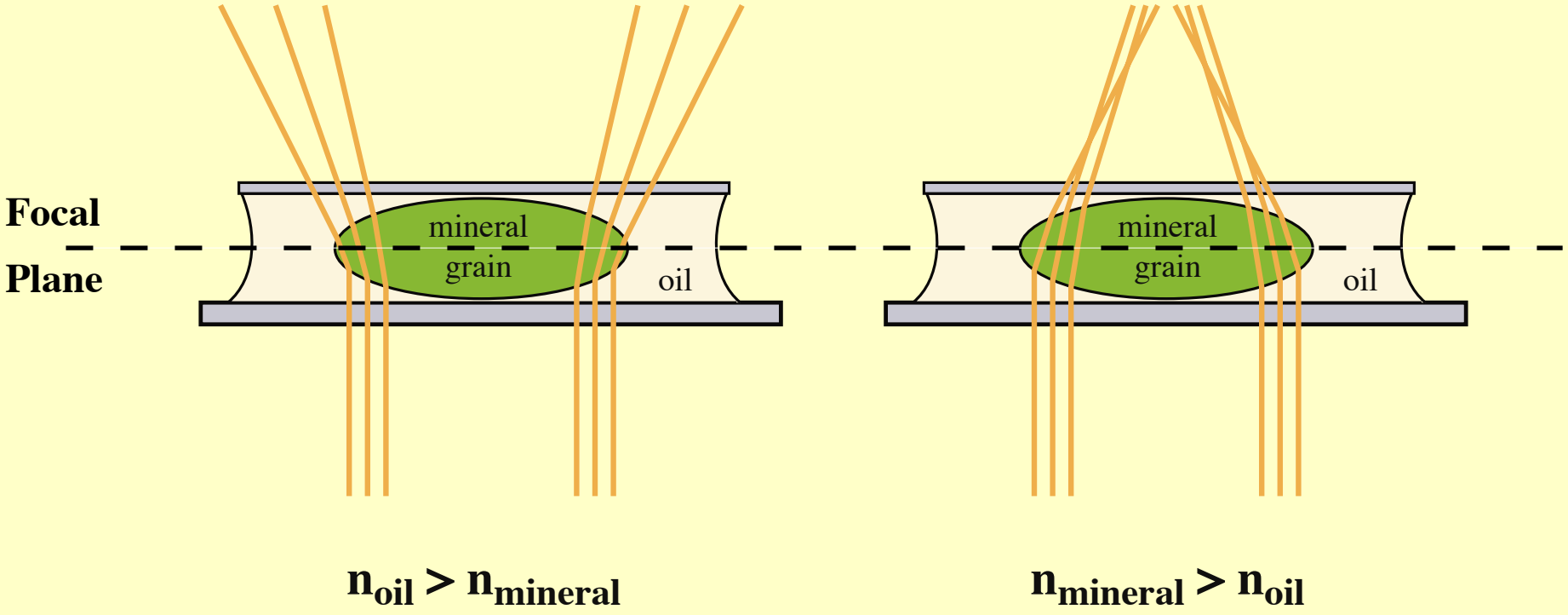
$$\theta_2 = \text{Sin}^{-1}\left[\frac{n_1}{n_2}\right]$$



$n_{oil} > n_{mineral}$

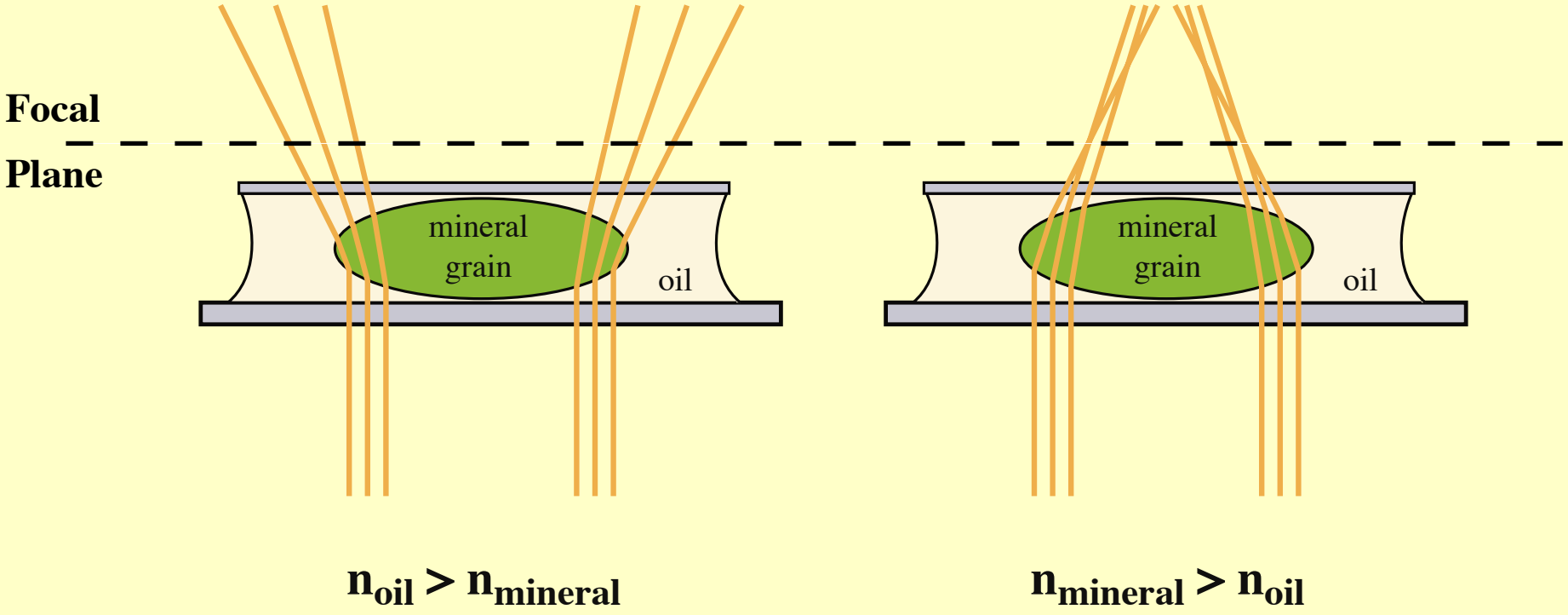


$n_{mineral} > n_{oil}$



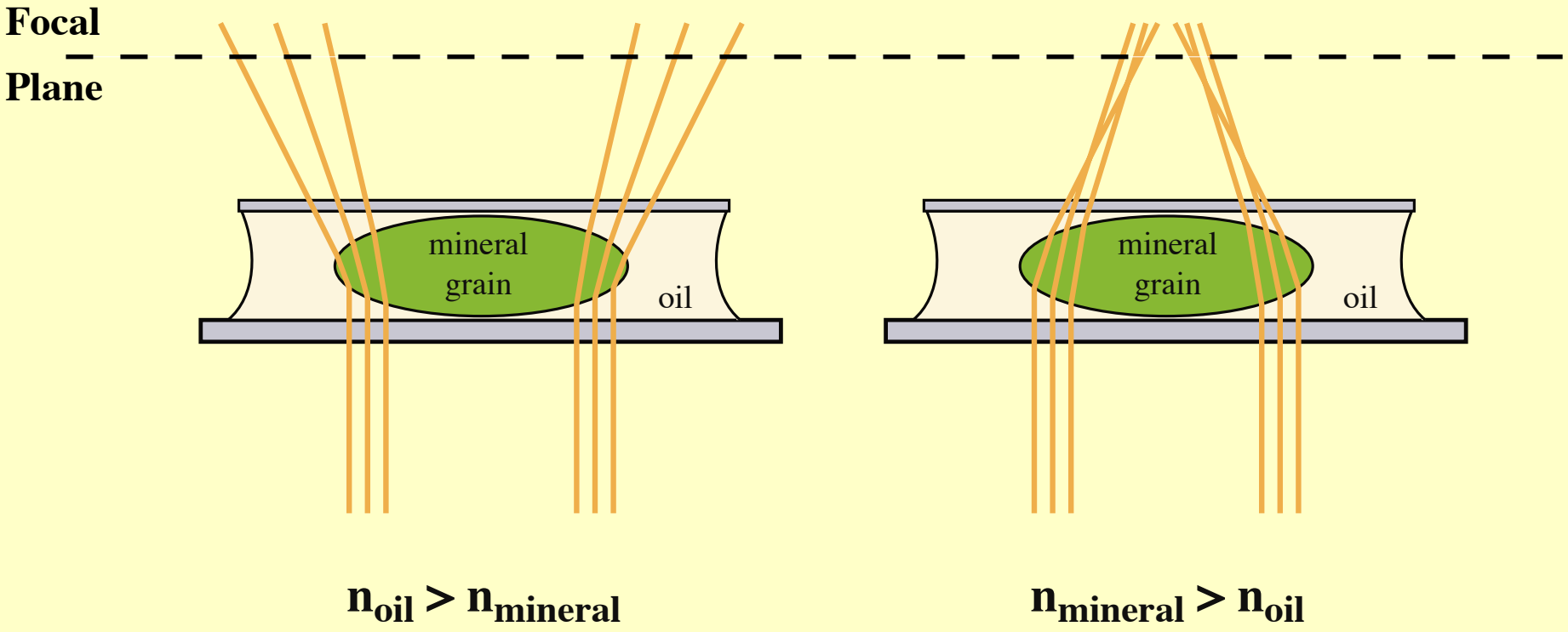
$n_{oil} > n_{mineral}$

$n_{mineral} > n_{oil}$



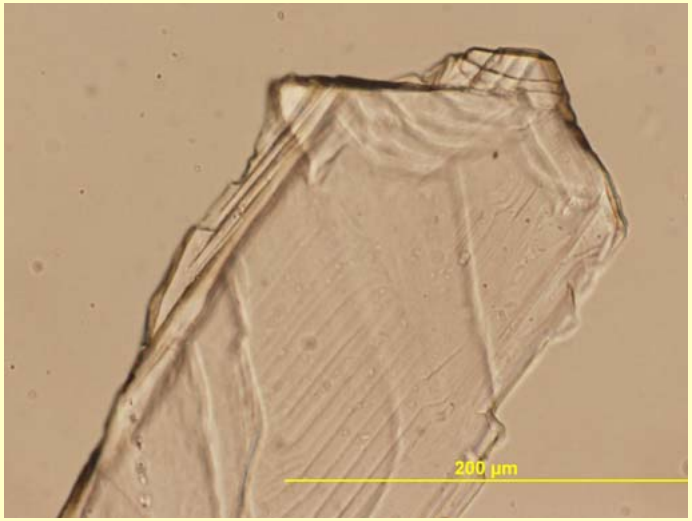
$n_{oil} > n_{mineral}$

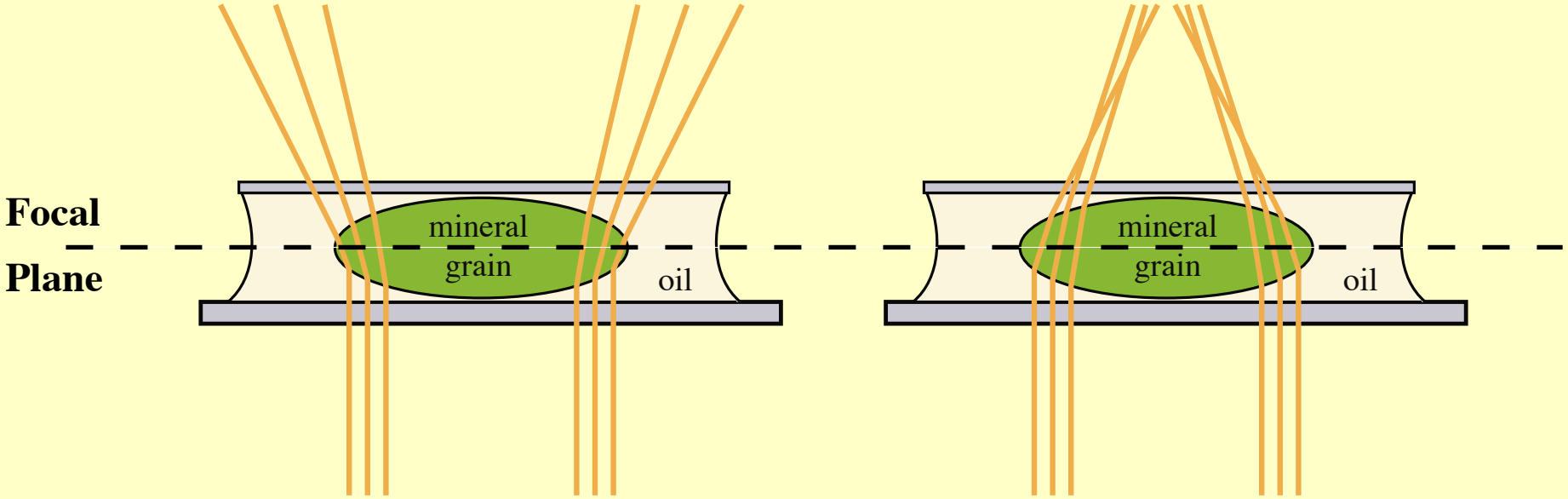
$n_{mineral} > n_{oil}$



$n_{oil} > n_{mineral}$

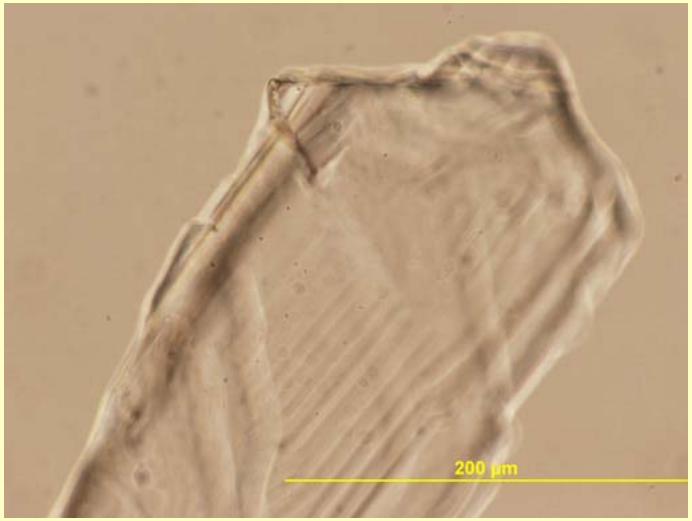
$n_{mineral} > n_{oil}$

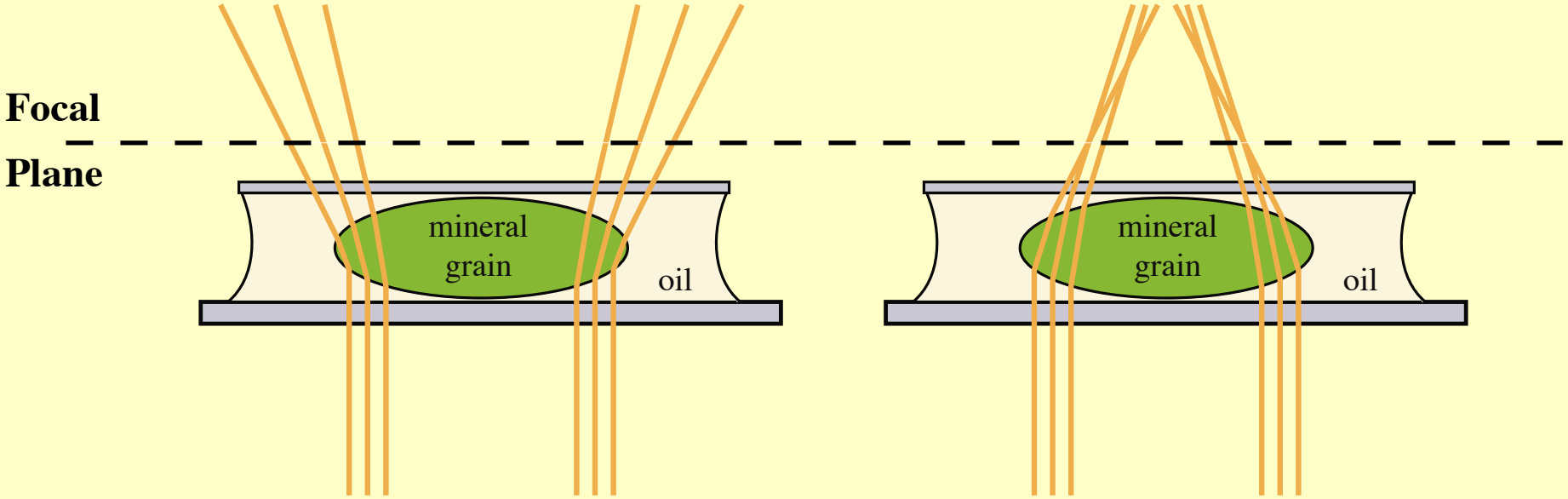




$n_{oil} > n_{mineral}$

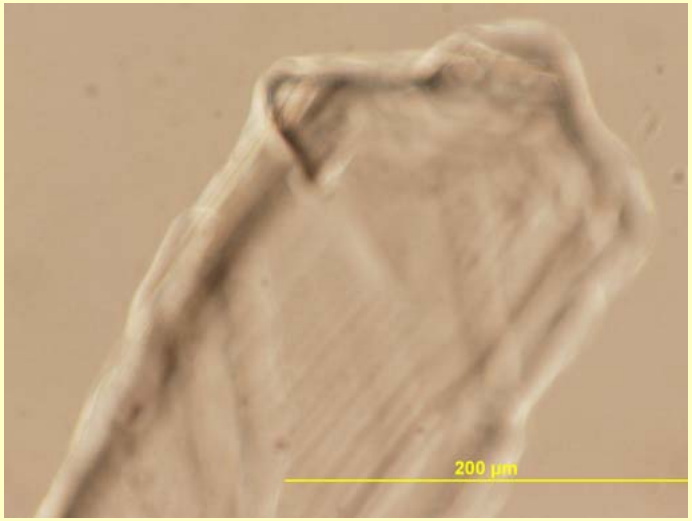
$n_{mineral} > n_{oil}$

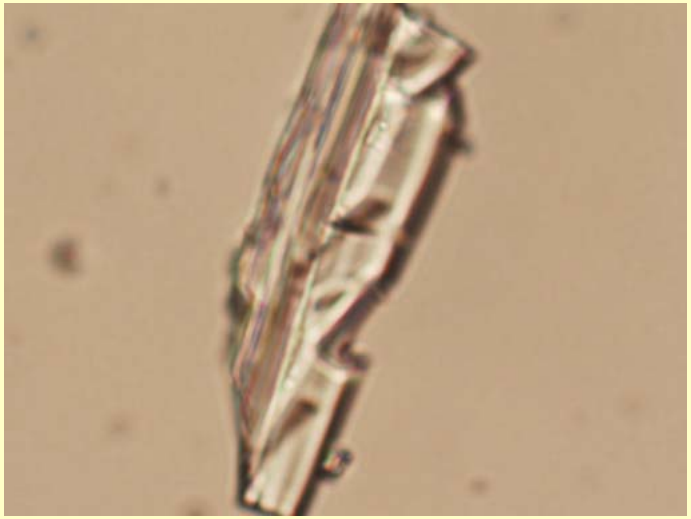


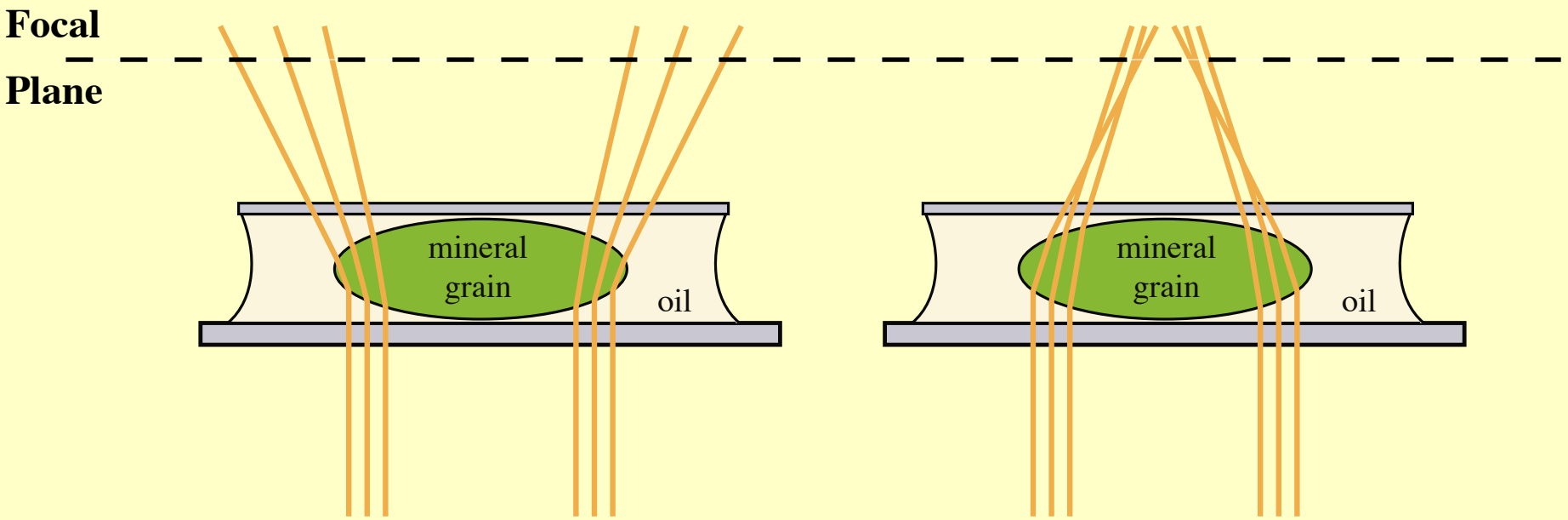


$n_{oil} > n_{mineral}$

$n_{mineral} > n_{oil}$

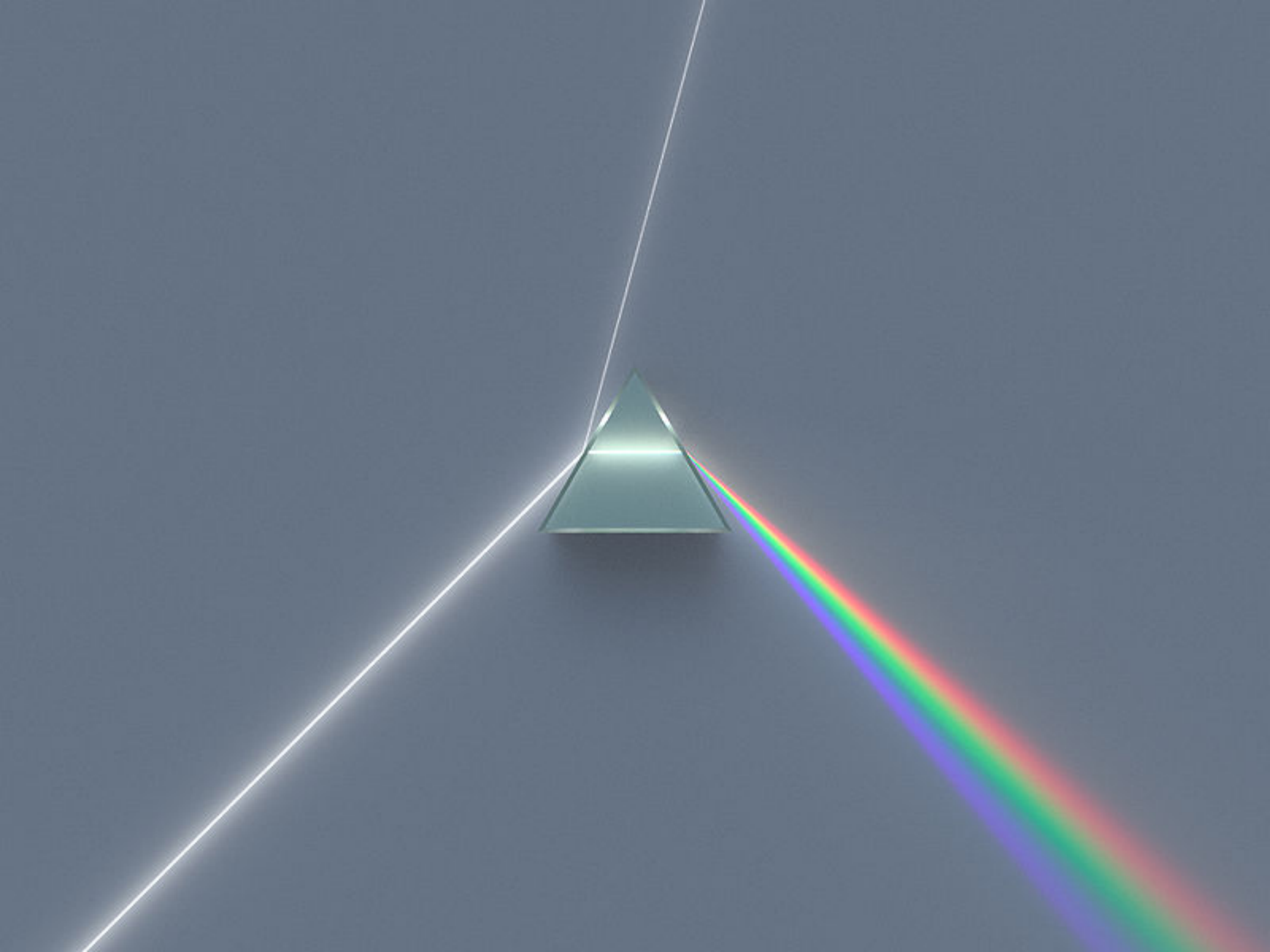


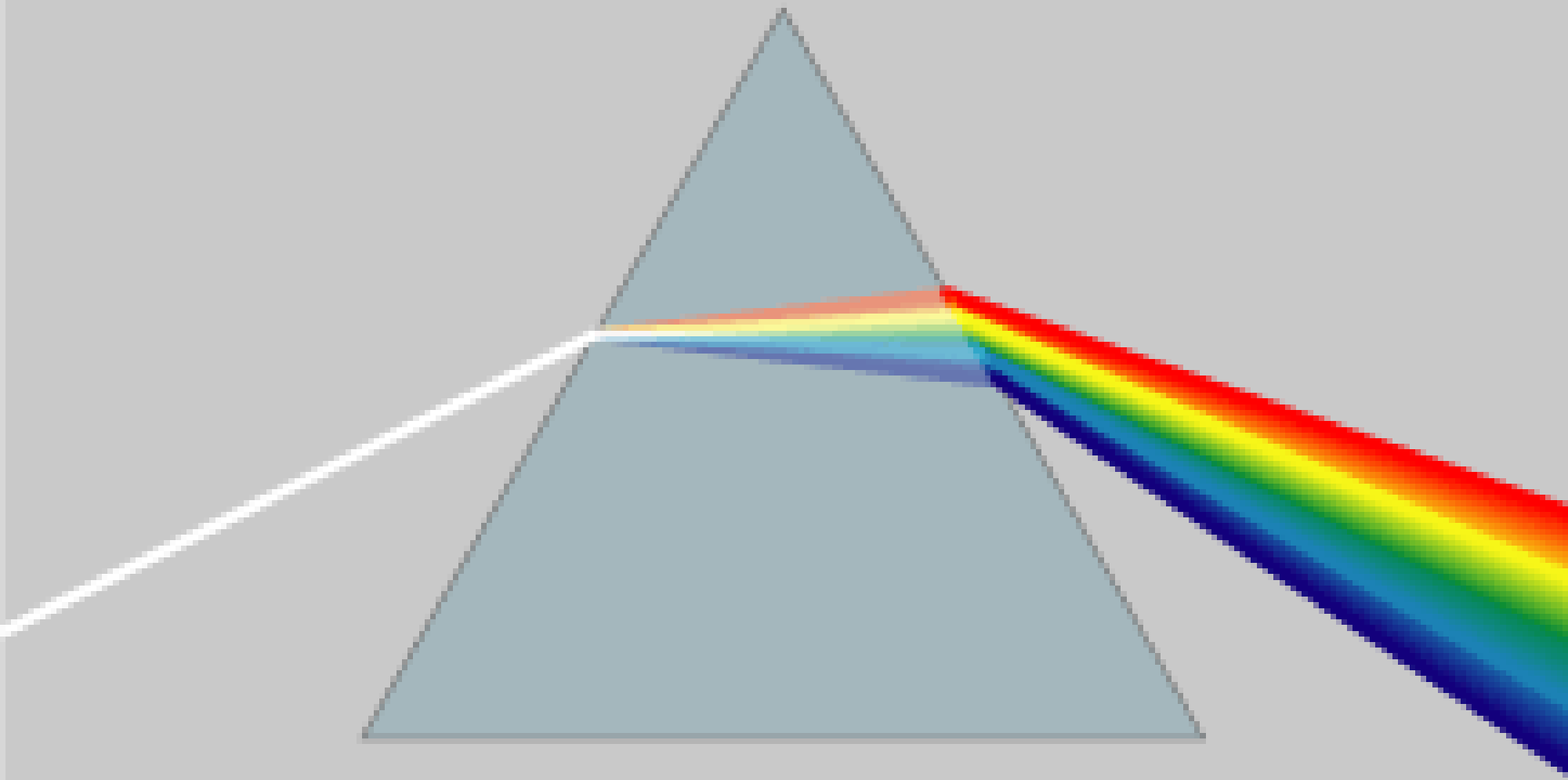


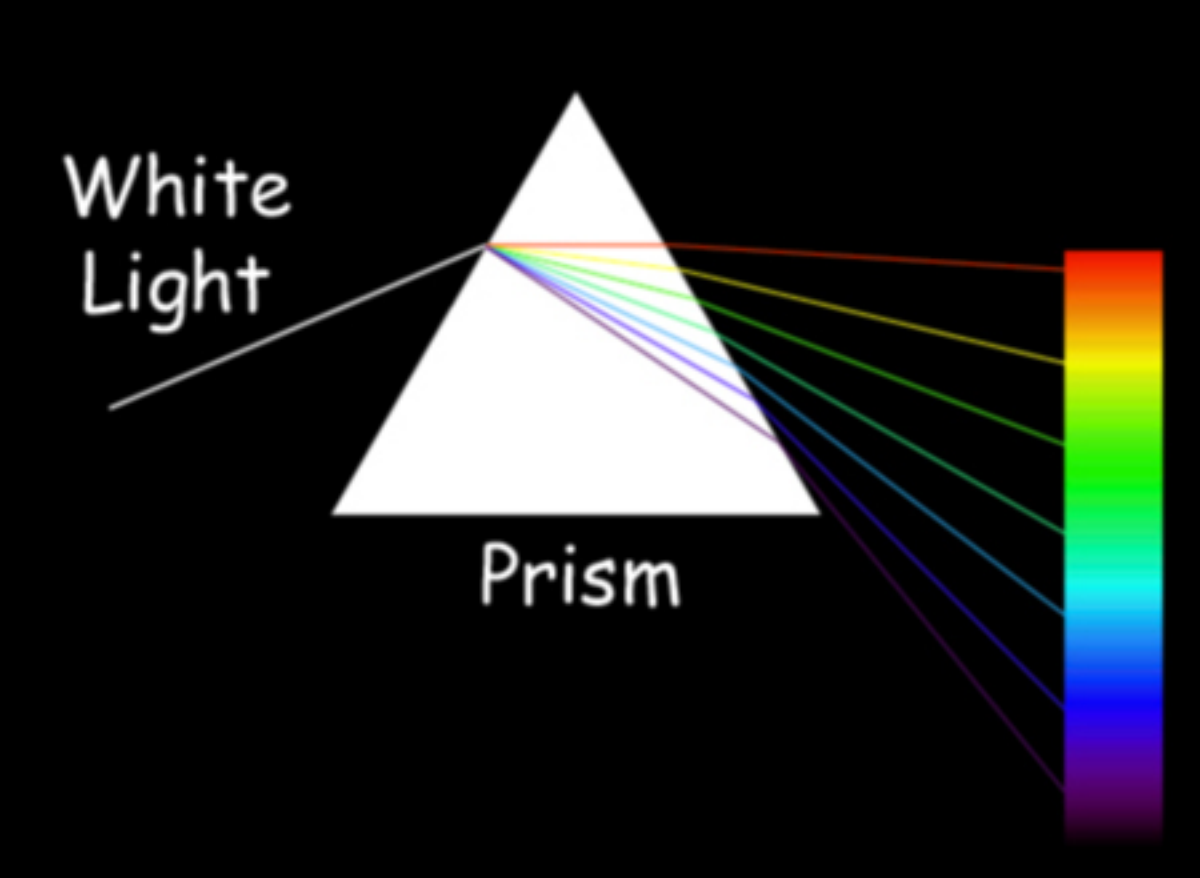


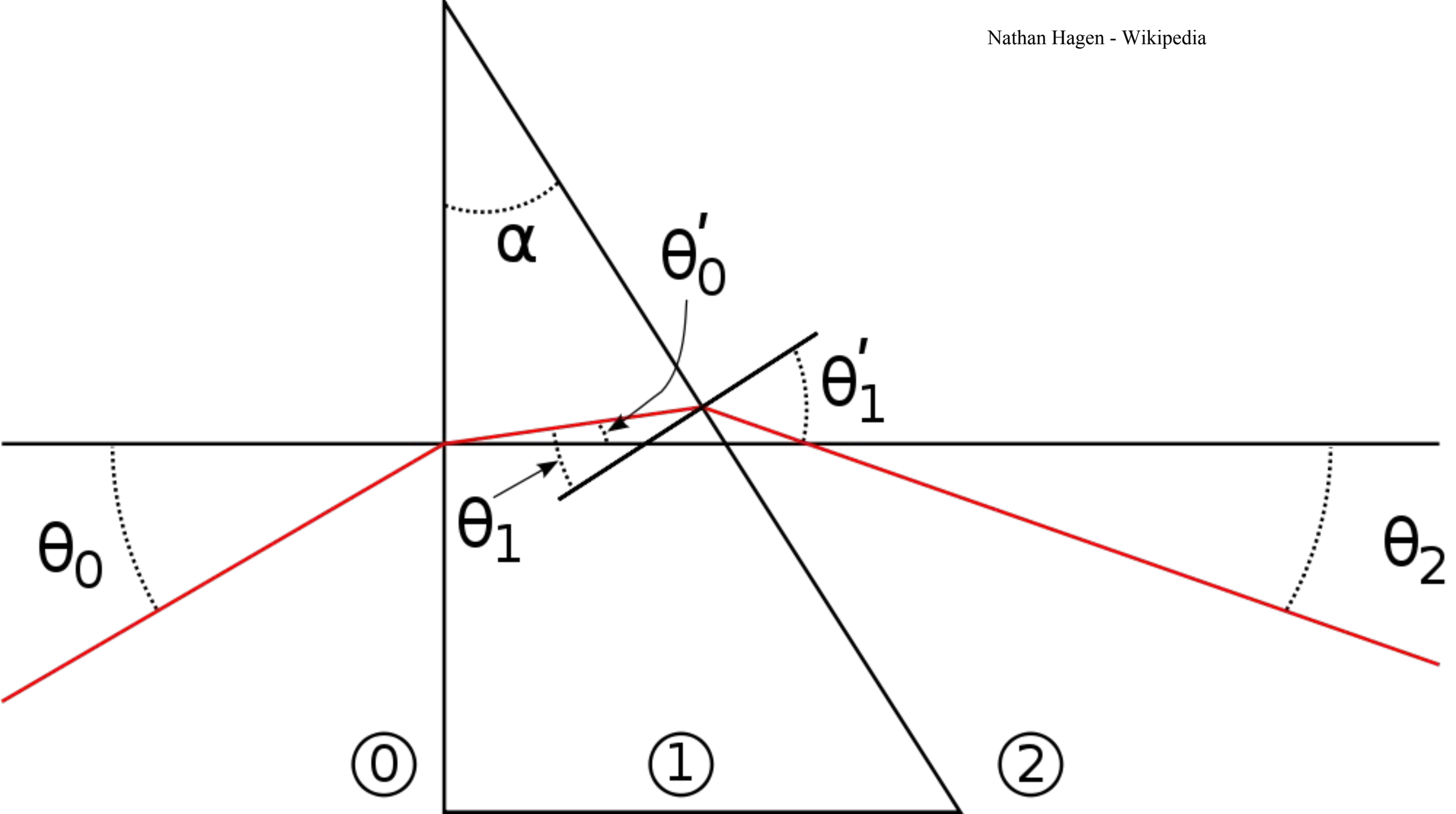
$n_{oil} > n_{mineral}$

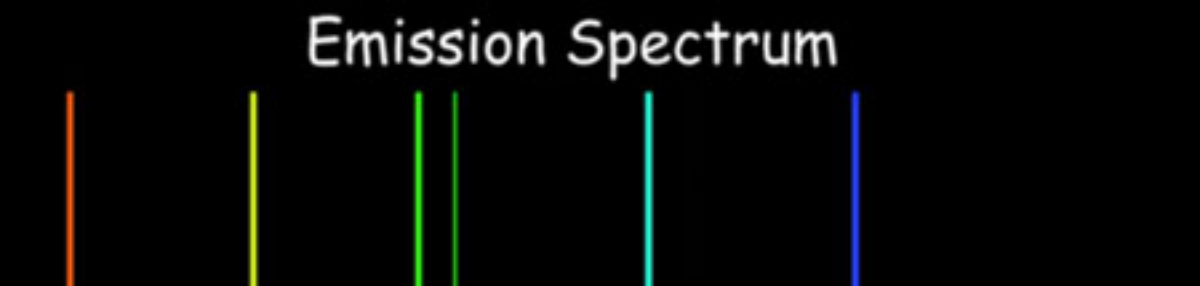
$n_{mineral} > n_{oil}$



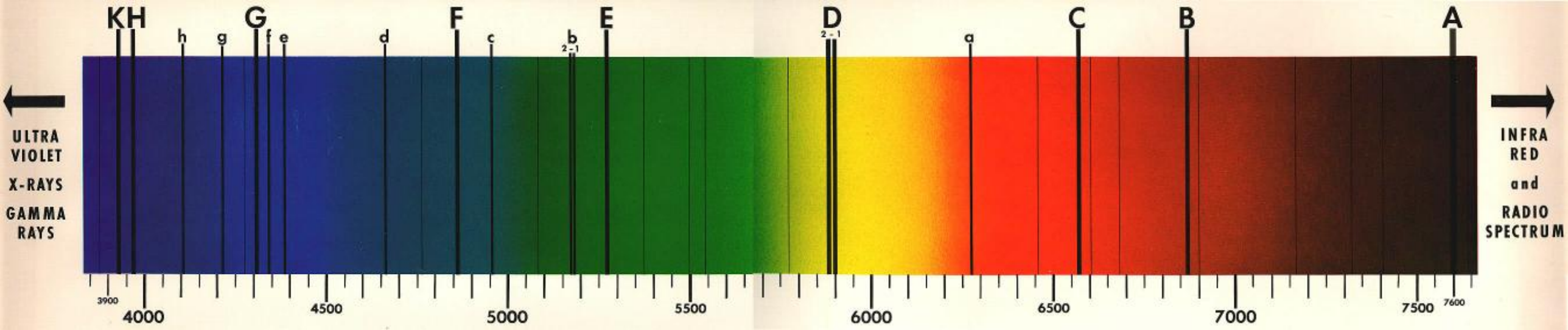



White
Light
Prism


Nathan Hagen - Wikipedia
α
θ′0
θ′1
θ0
θ1
θ2
0
1
2

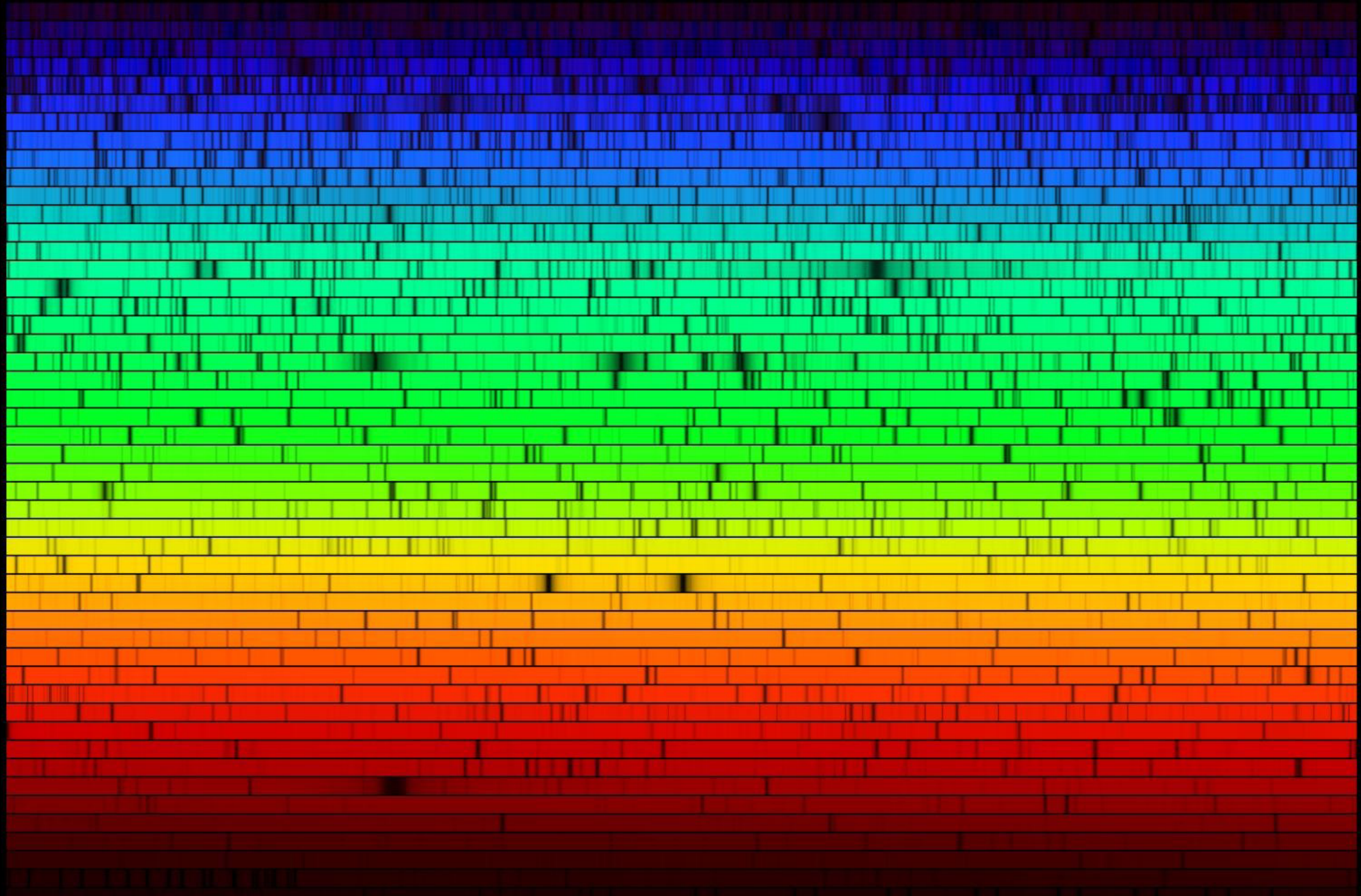

Emission Spectrum


Absorption Spectrum

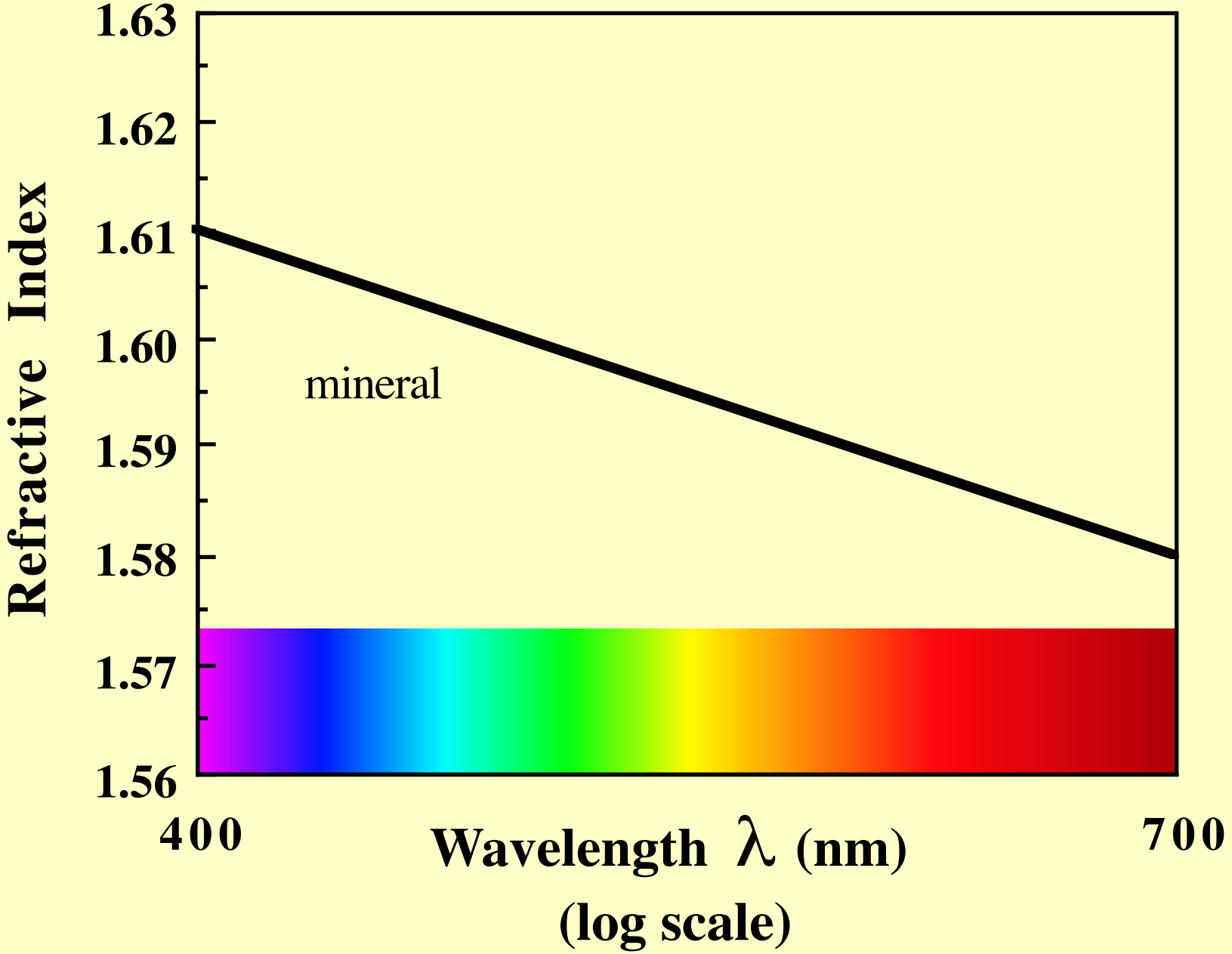

K
H
h
g
G
f
e
d
F
c
b
2 - 1
E
D
2 - 1
a
C
B
A
ULTRA VIOLET
X-RAYS
GAMMA RAYS
INFRA RED
and
RADIO SPECTRUM
3900
4000
4500
5000
5500
6000
6500
7000
7500
7600

Prominent Fraunhofer Lines

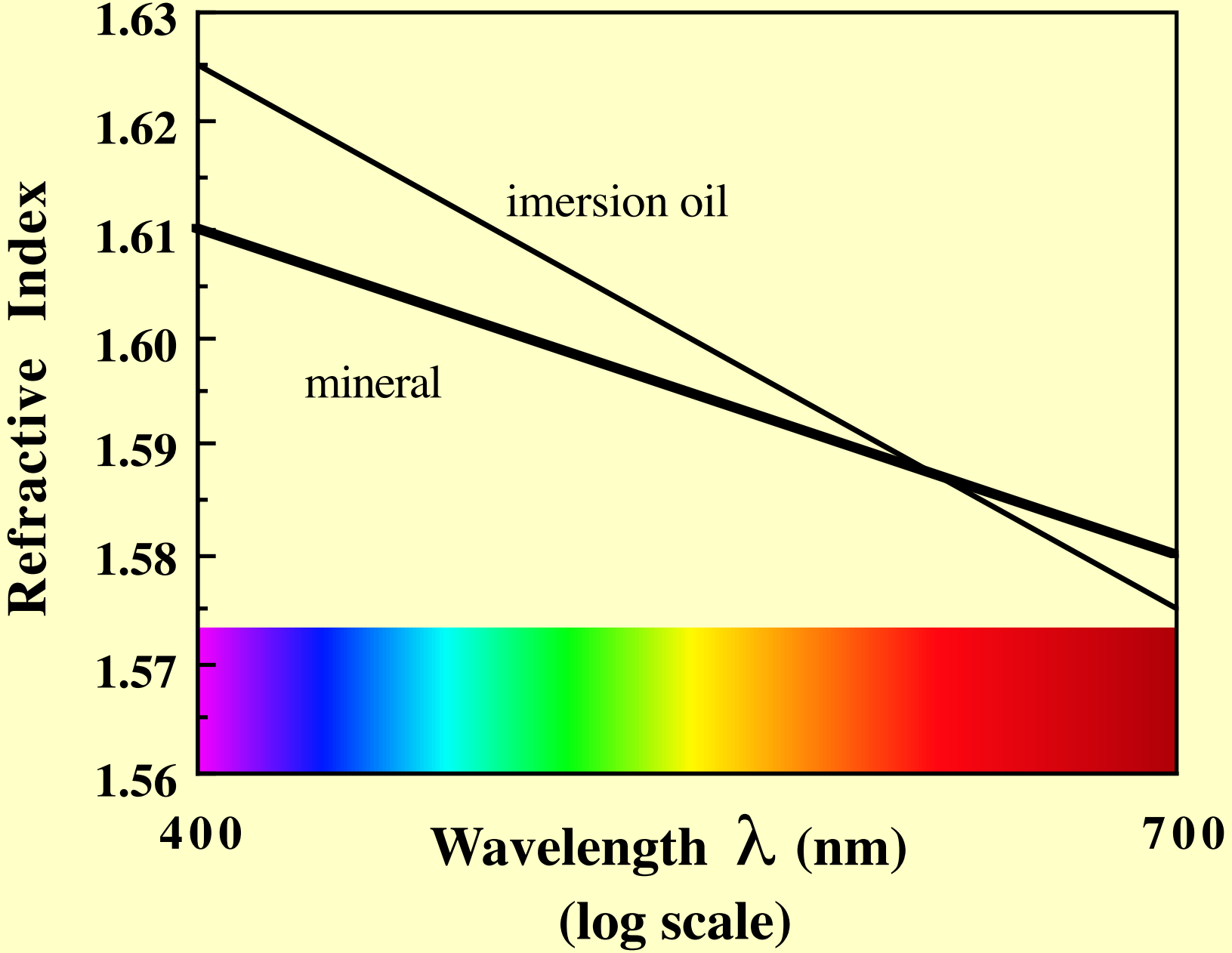
Lines	Due To	Wavelengths (Å)
A - (band)	O2	7594 - 7621
B - (band)	O2	6867 - 6884
C	H	6563
a - (band)	O2	6276 - 6287
D - 1, 2	Na	5896 & 5890
E	Fe	5270
b - 1, 2	Mg	5184 & 5173
c	Fe	4958
F	H	4861
d	Fe	4668
e	Fe	4384
f	H	4340
G	Fe & Ca	4308
g	Ca	4227
h	H	4102
H	Ca	3968
K	Ca	3934


Solar Spectrum - NOAO/AURA/NSF

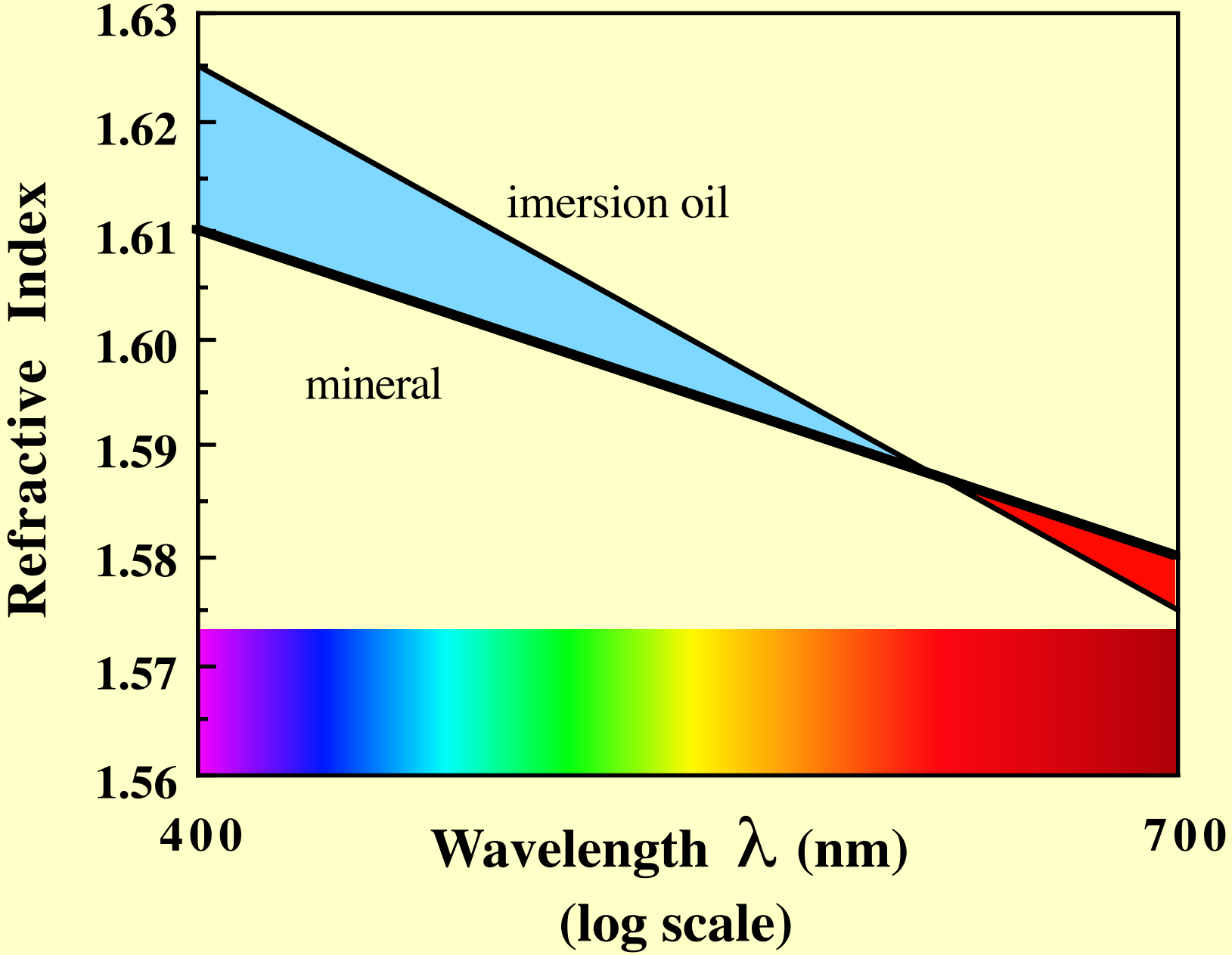
Dispersion


1.63
1.62
1.61
1.60
1.59
1.58
1.57
1.56
Refractive Index
mineral
400
700
Wavelength λ (nm)
(log scale)

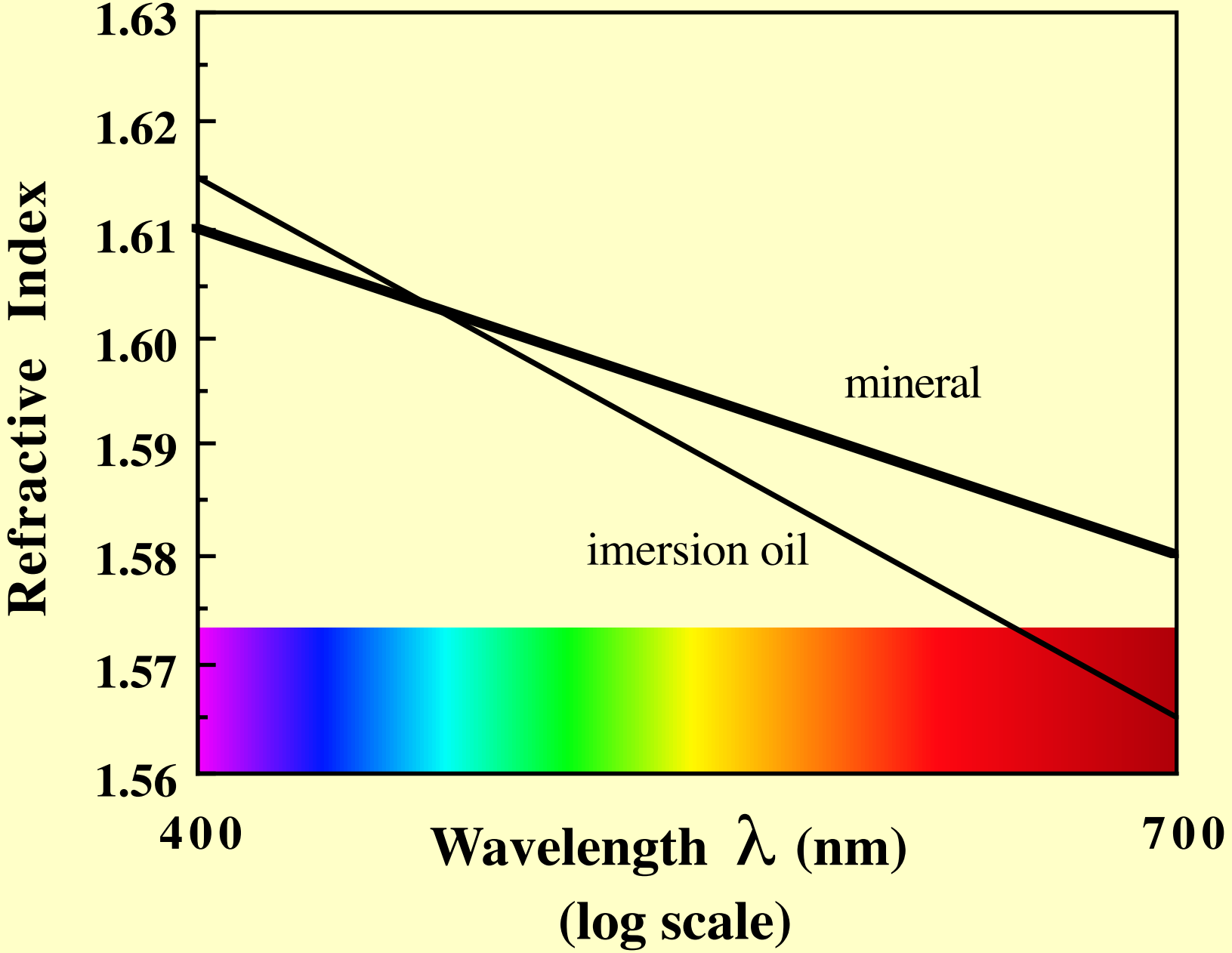
Dispersion


1.63
1.62
1.61
1.60
1.59
1.58
1.57
1.56
Refractive Index
imersion oil
mineral
400
700
Wavelength λ (nm)
(log scale)

Dispersion


1.63
1.62
1.61
1.60
1.59
1.58
1.57
1.56
Refractive Index
imersion oil
mineral
400
700
Wavelength λ (nm)
(log scale)

Dispersion


1.63
1.62
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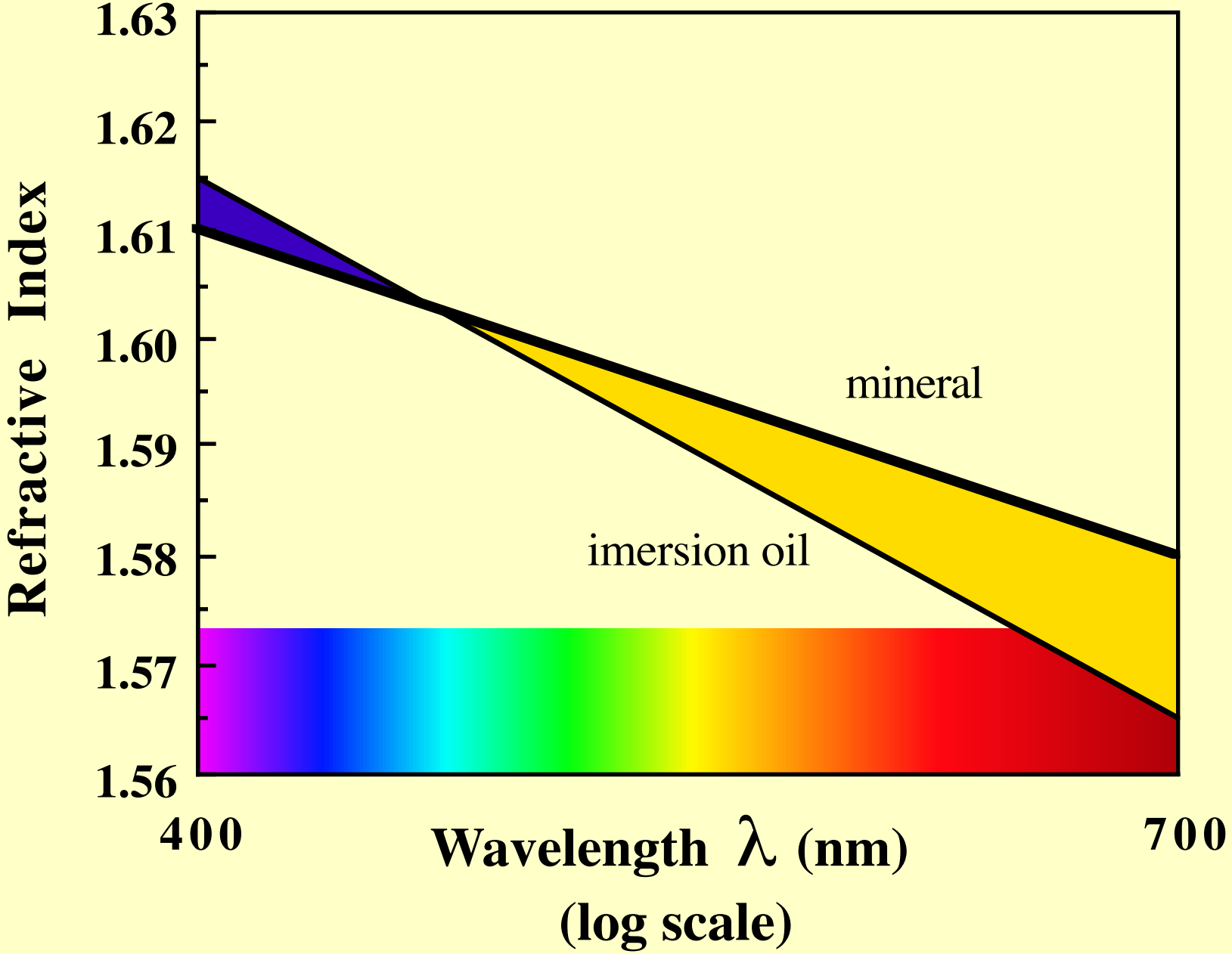
1.60
1.59
1.58
1.57
1.56
Refractive Index
mineral
imersion oil
400
700
Wavelength λ (nm)
(log scale)

Dispersion


1.63
1.62
1.61
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1.57
1.56
Refractive Index
mineral
imersion oil
400
700
Wavelength λ (nm)
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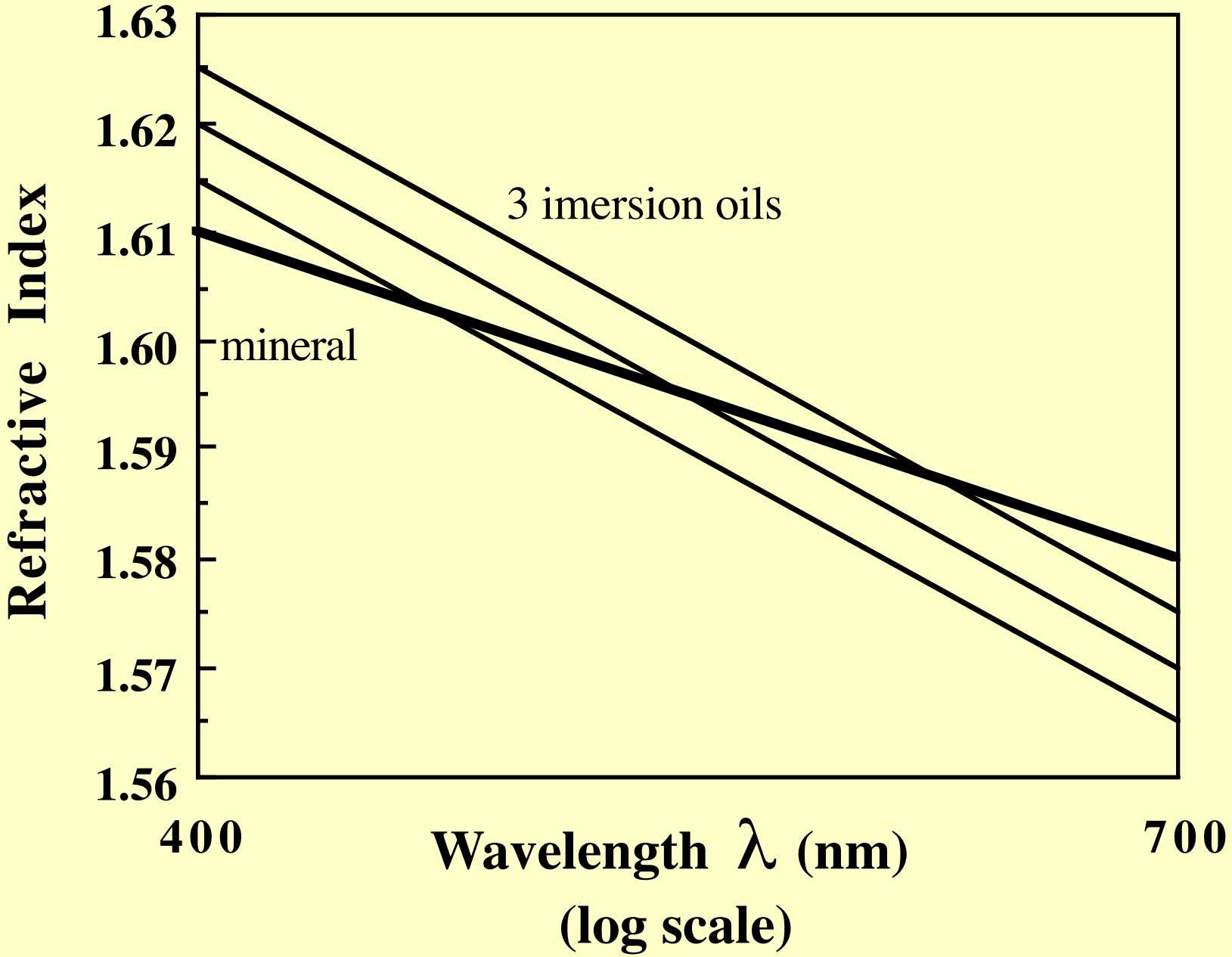
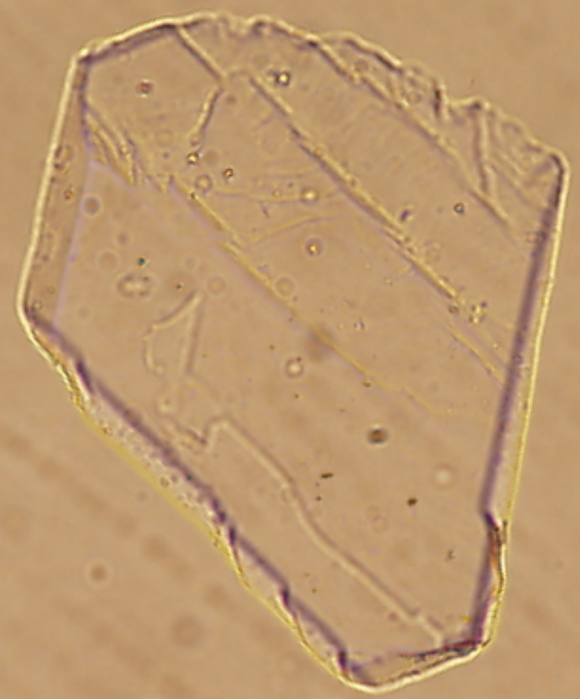
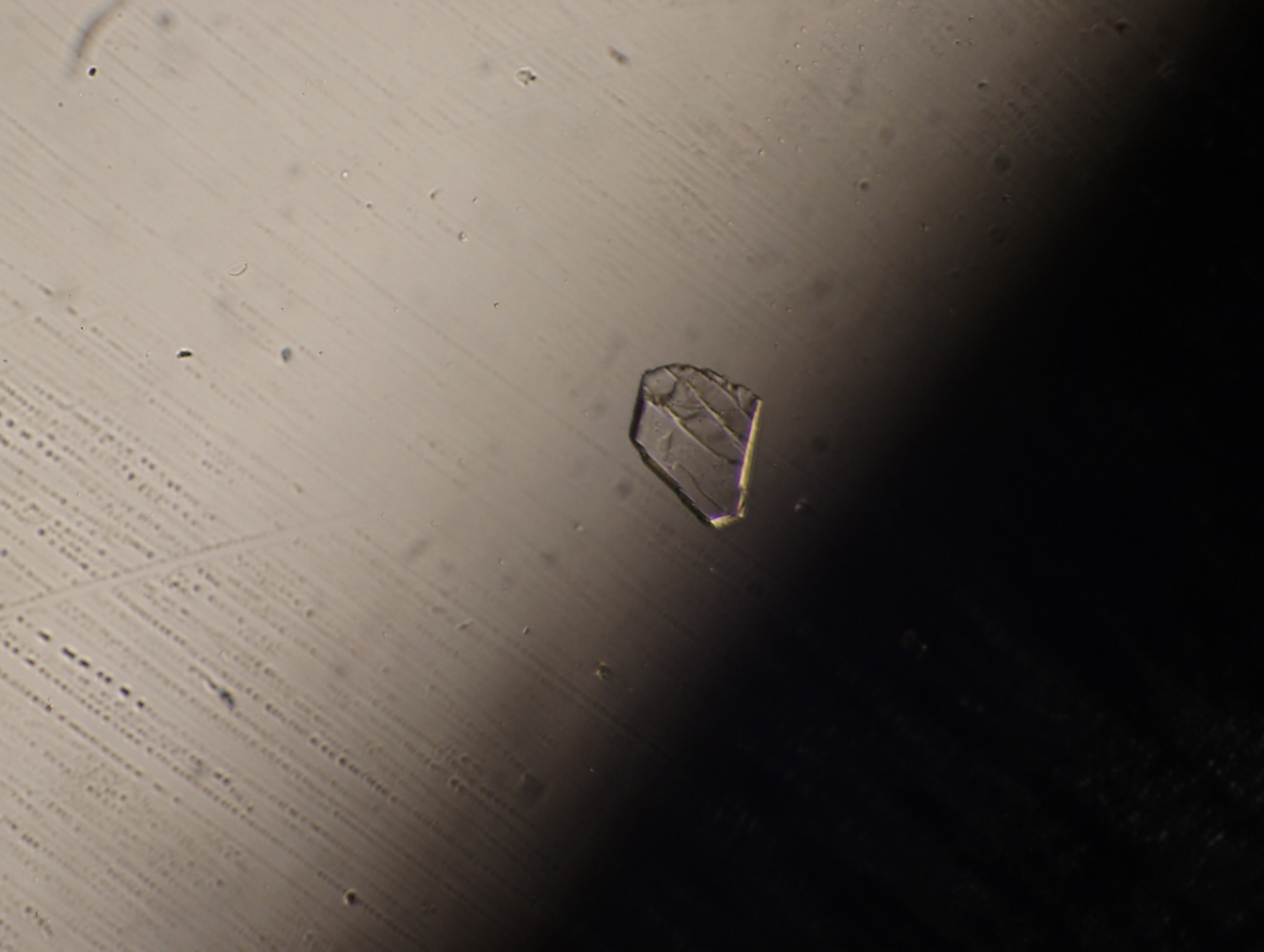
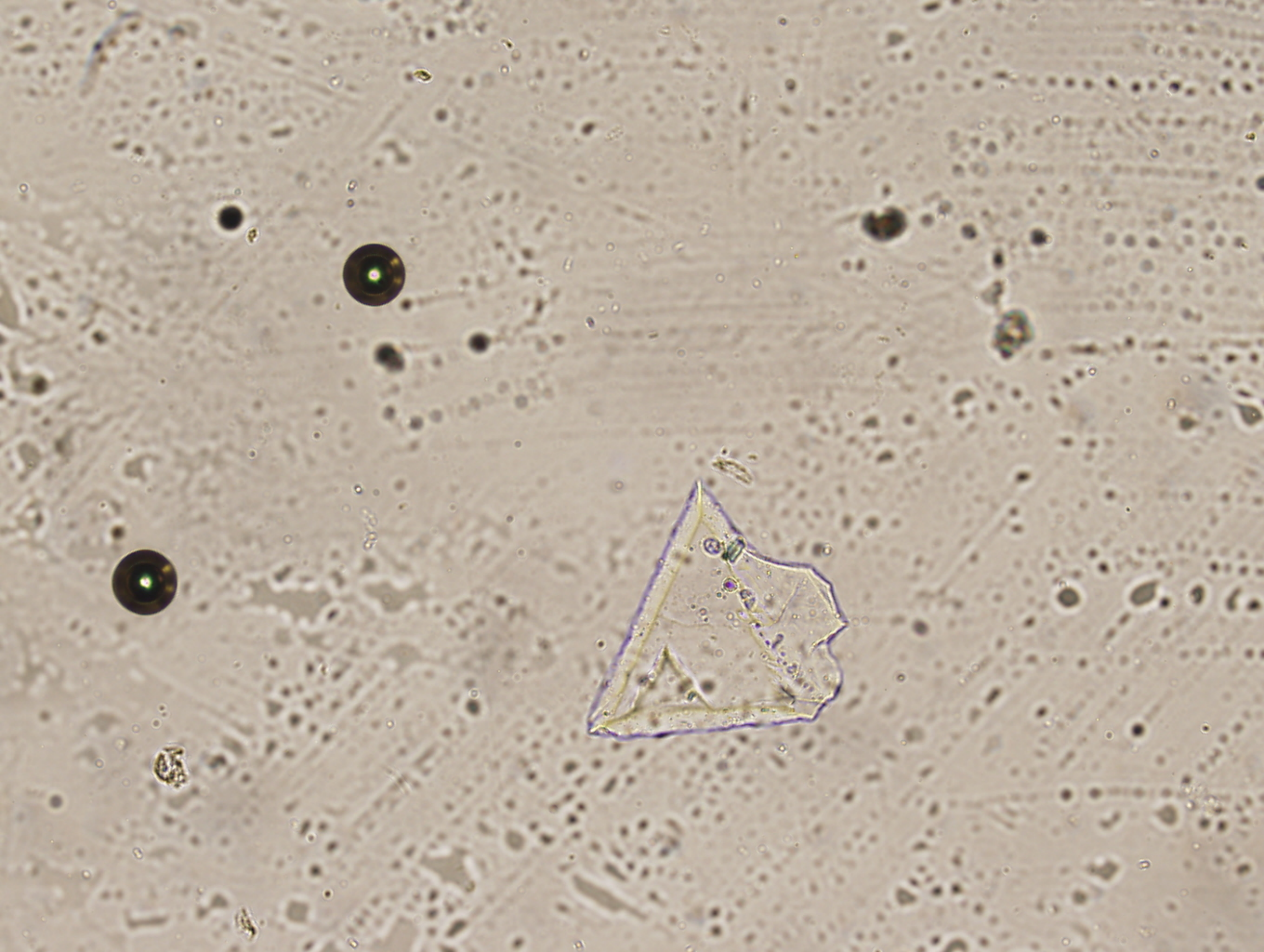
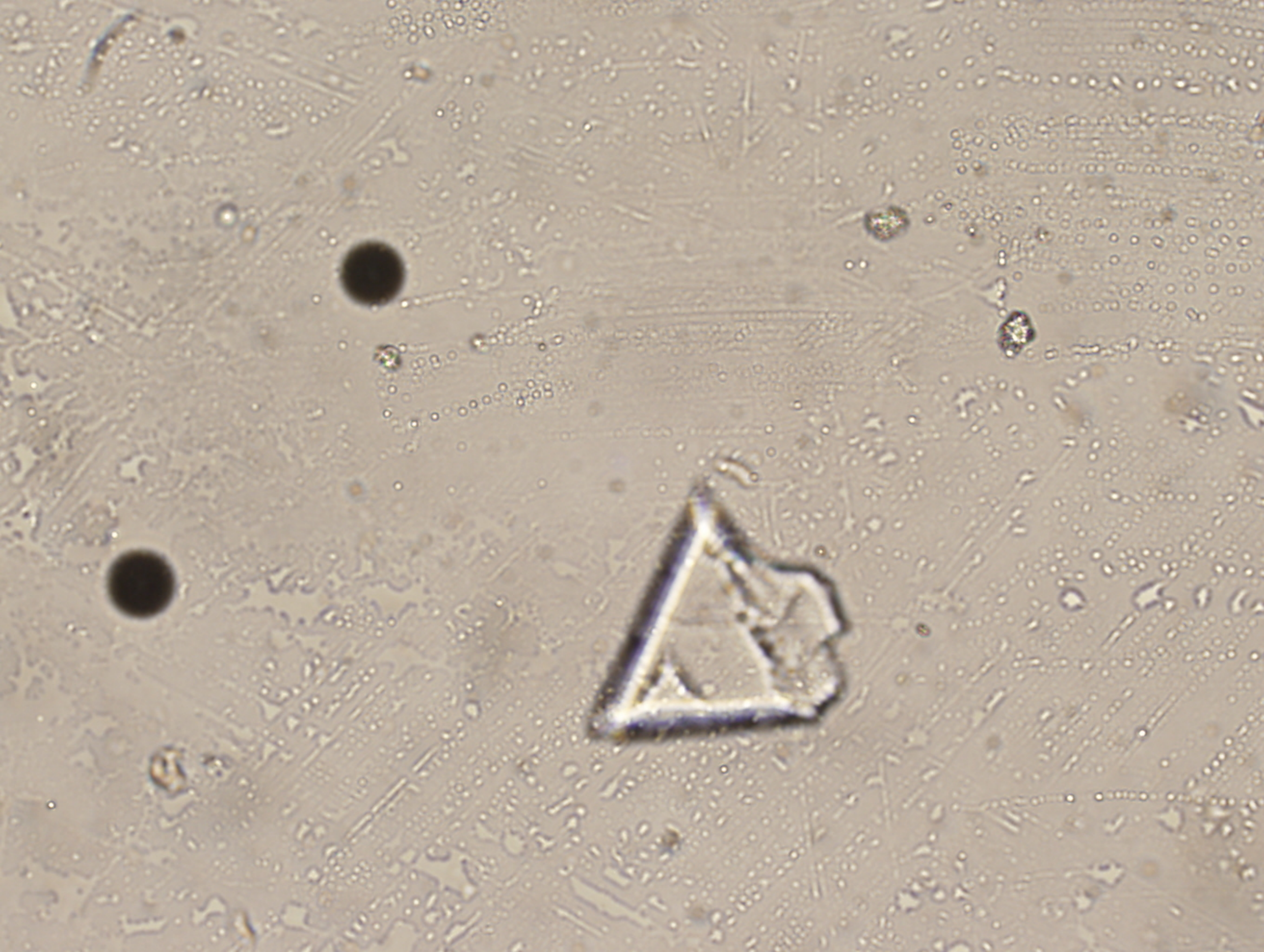
Dispersion

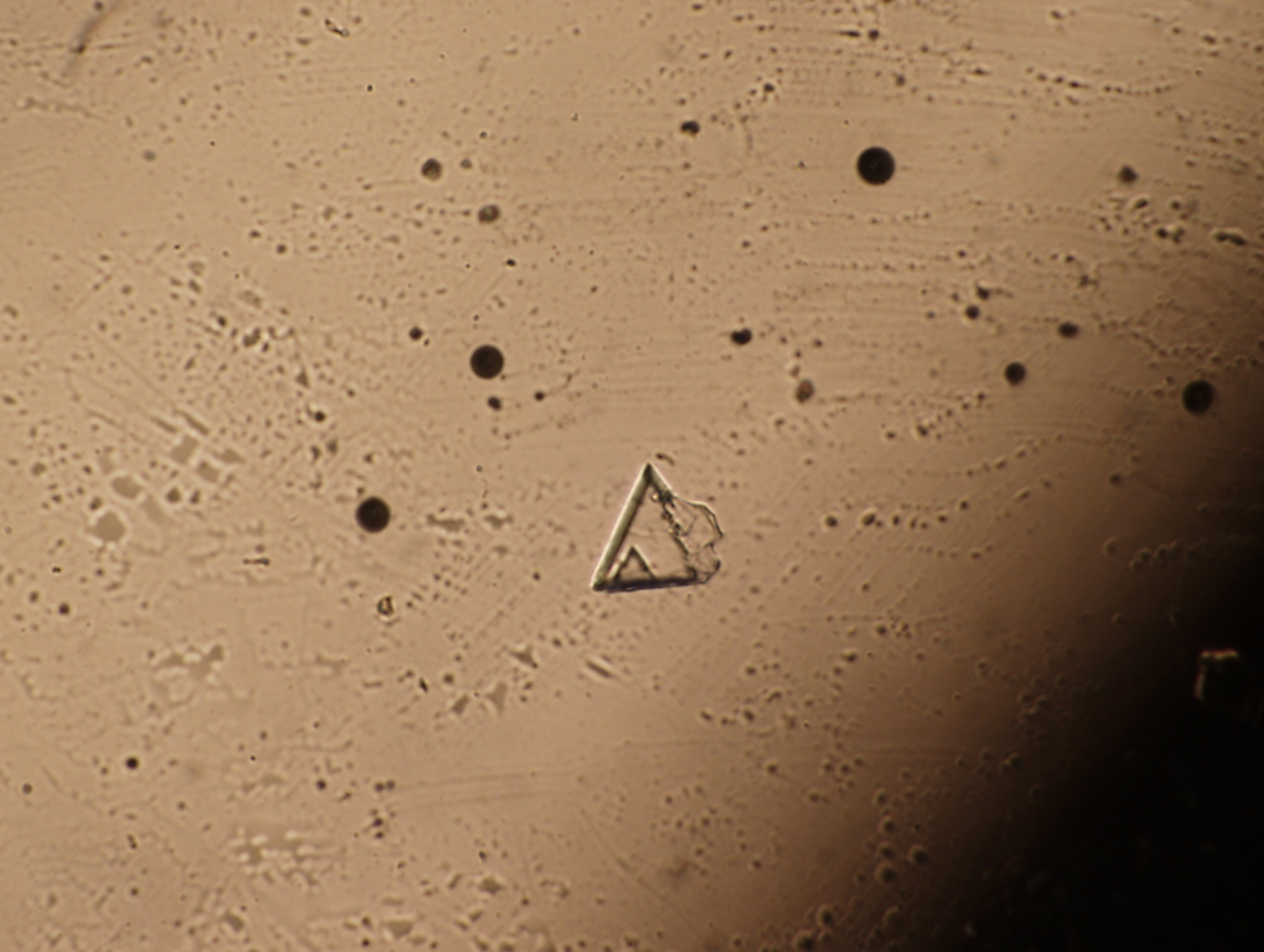

1.63
1.62
1.61
1.60
1.59
1.58
1.57
1.56
Refractive Index
3 imersion oils
mineral
400
700
Wavelength λ (nm)
(log scale)

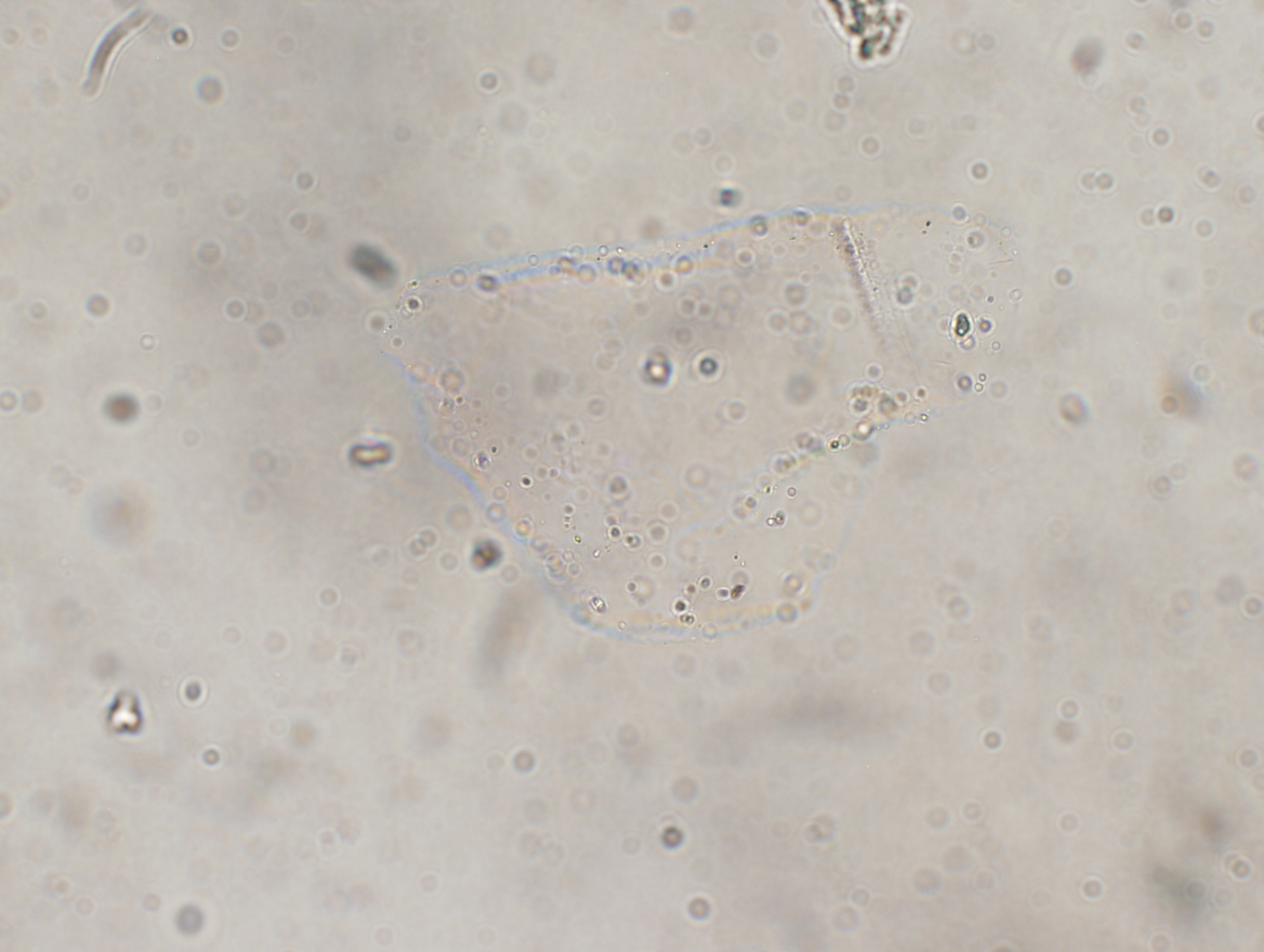


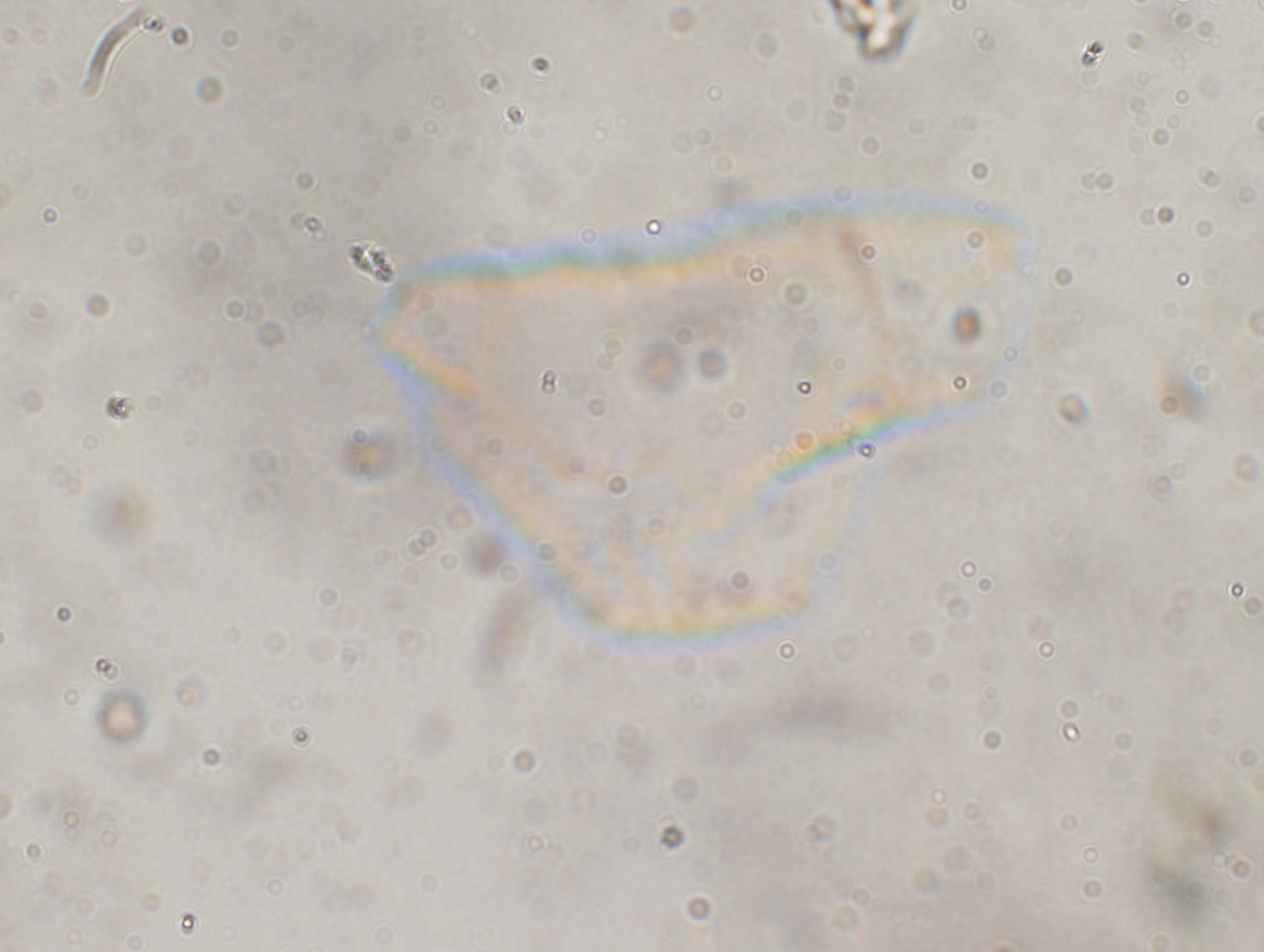




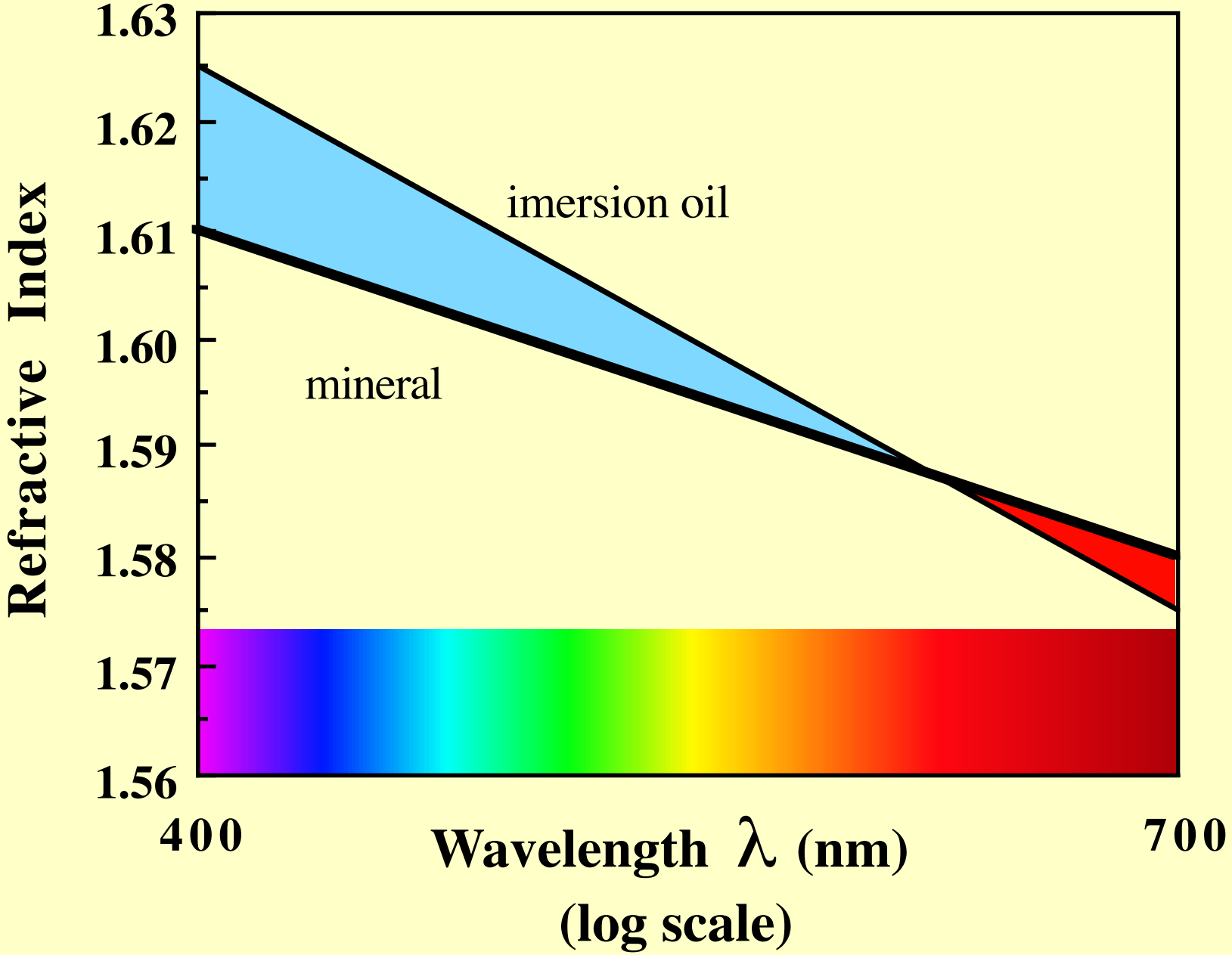




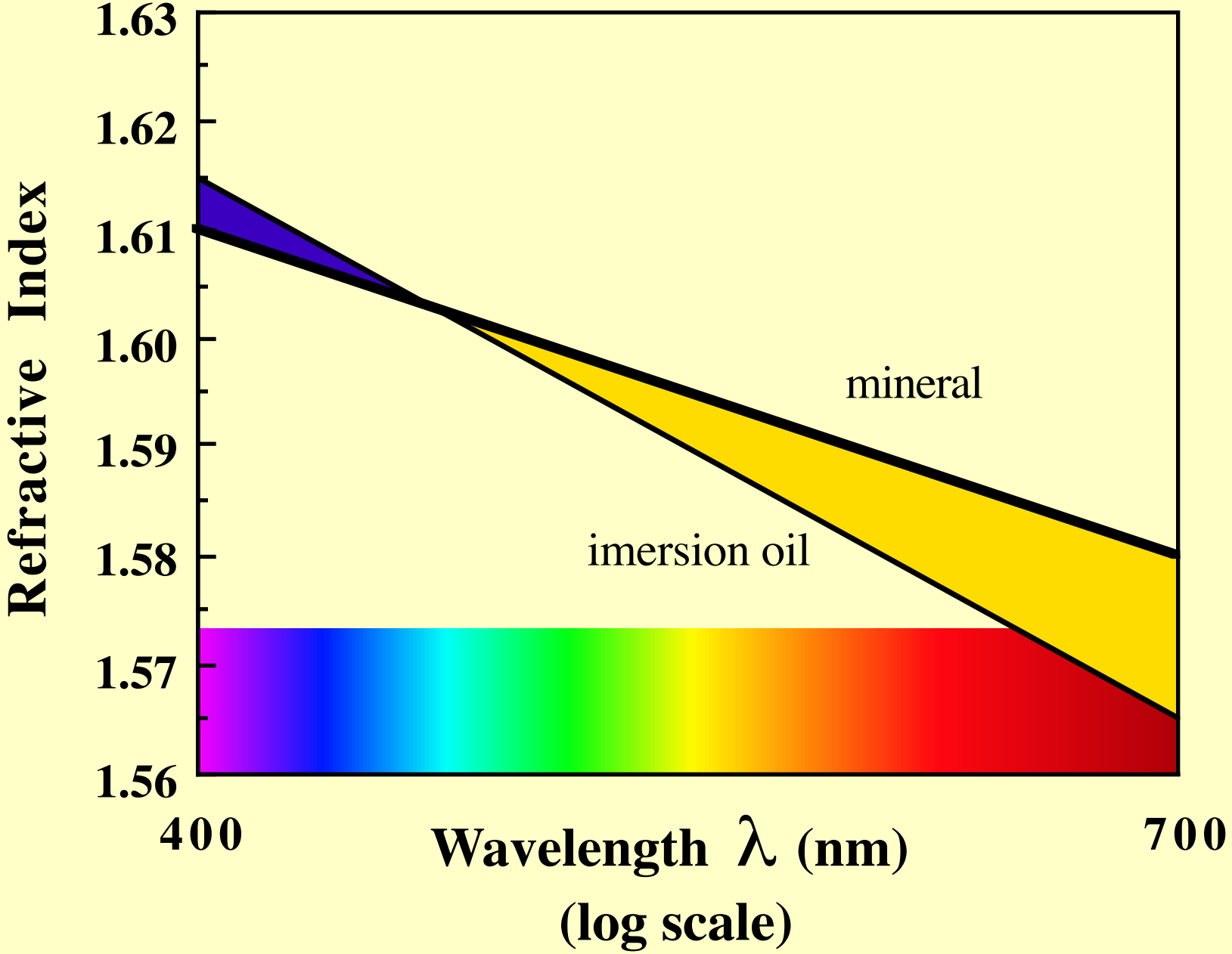




Dispersion


1.63
1.62
1.61
1.60
1.59
1.58
1.57
1.56
Refractive Index
imersion oil
mineral
400
700
Wavelength λ (nm)
(log scale)

Dispersion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