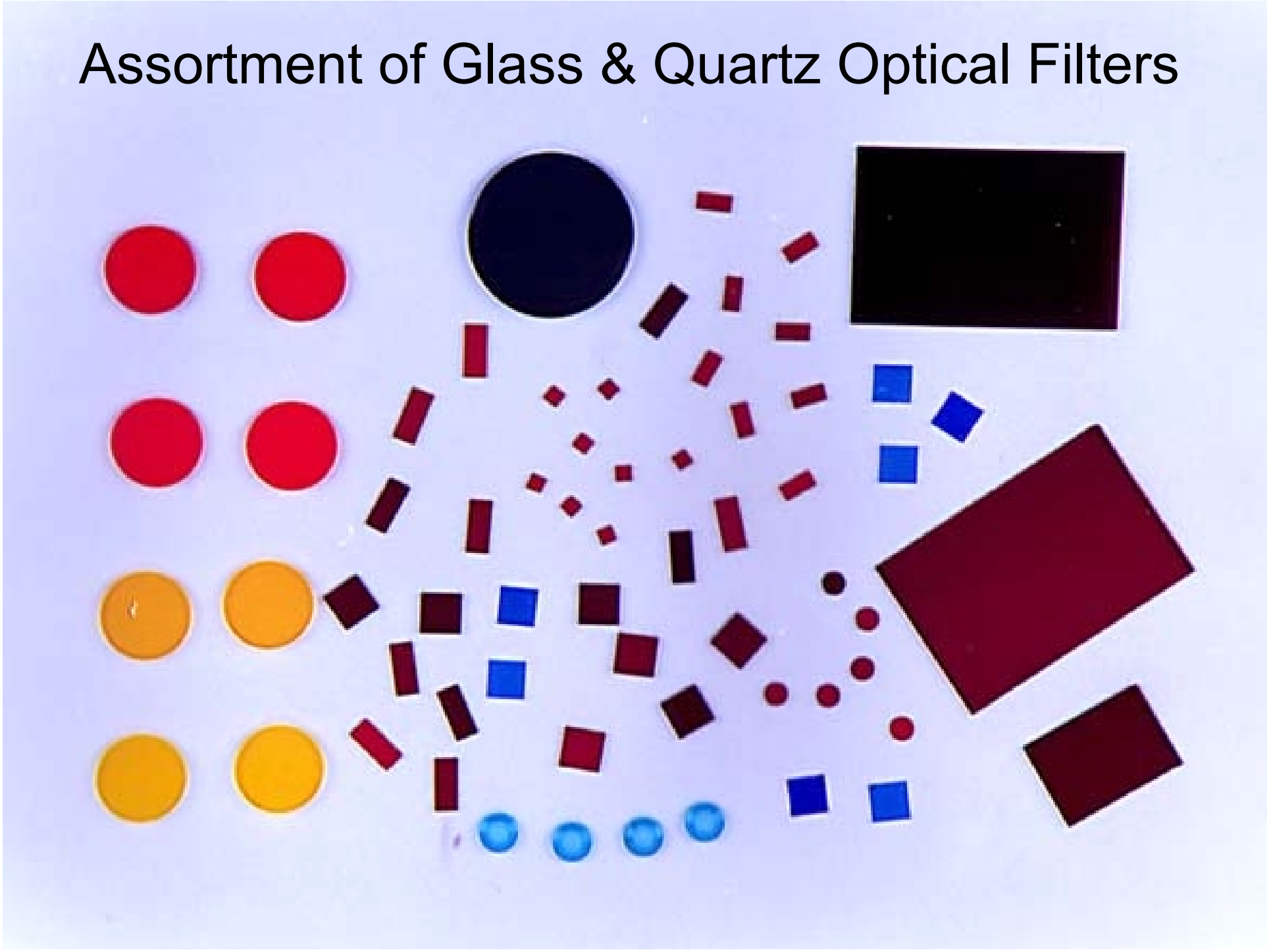
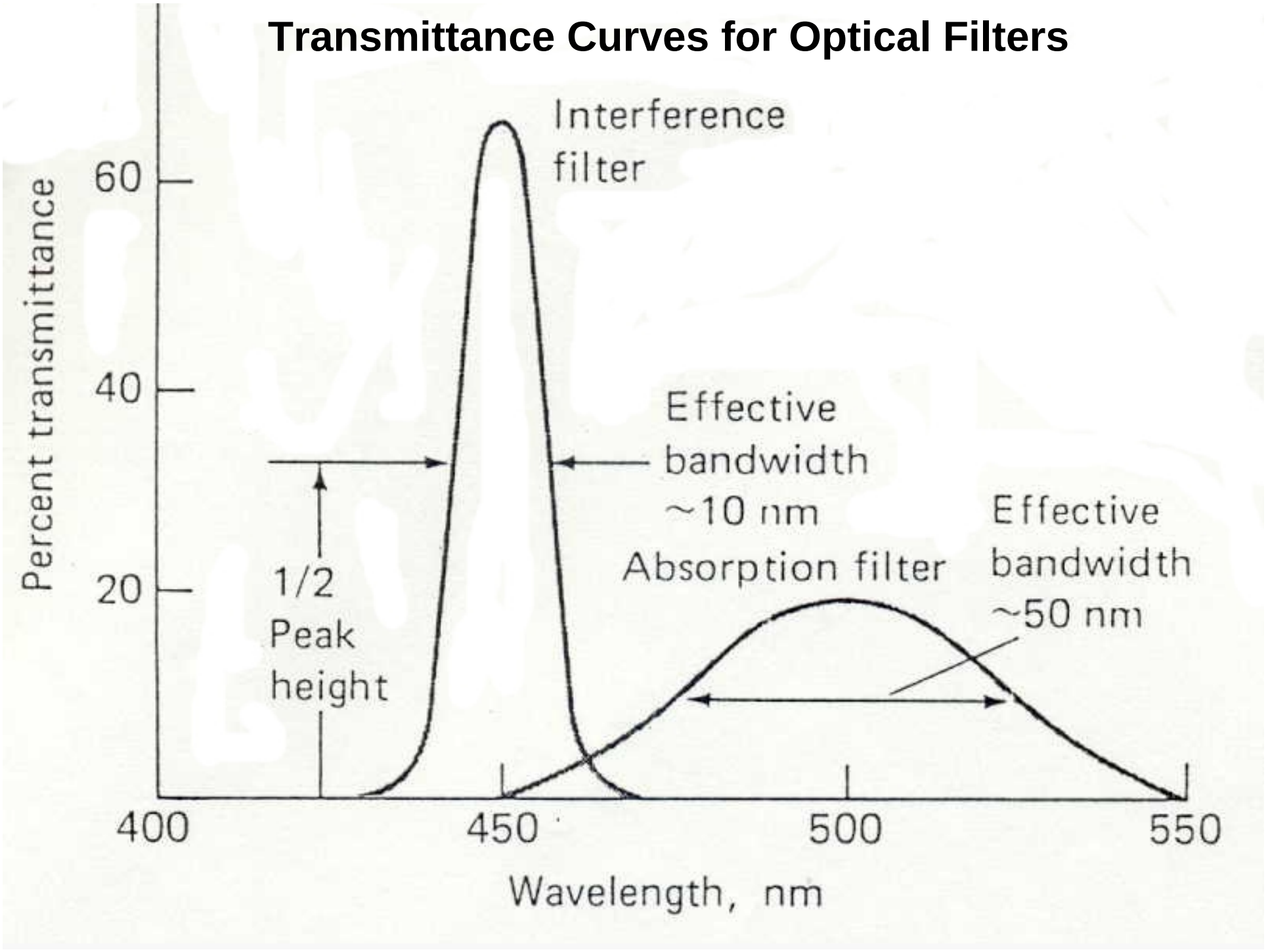
Assortment of Glass & Quartz Optical Filters

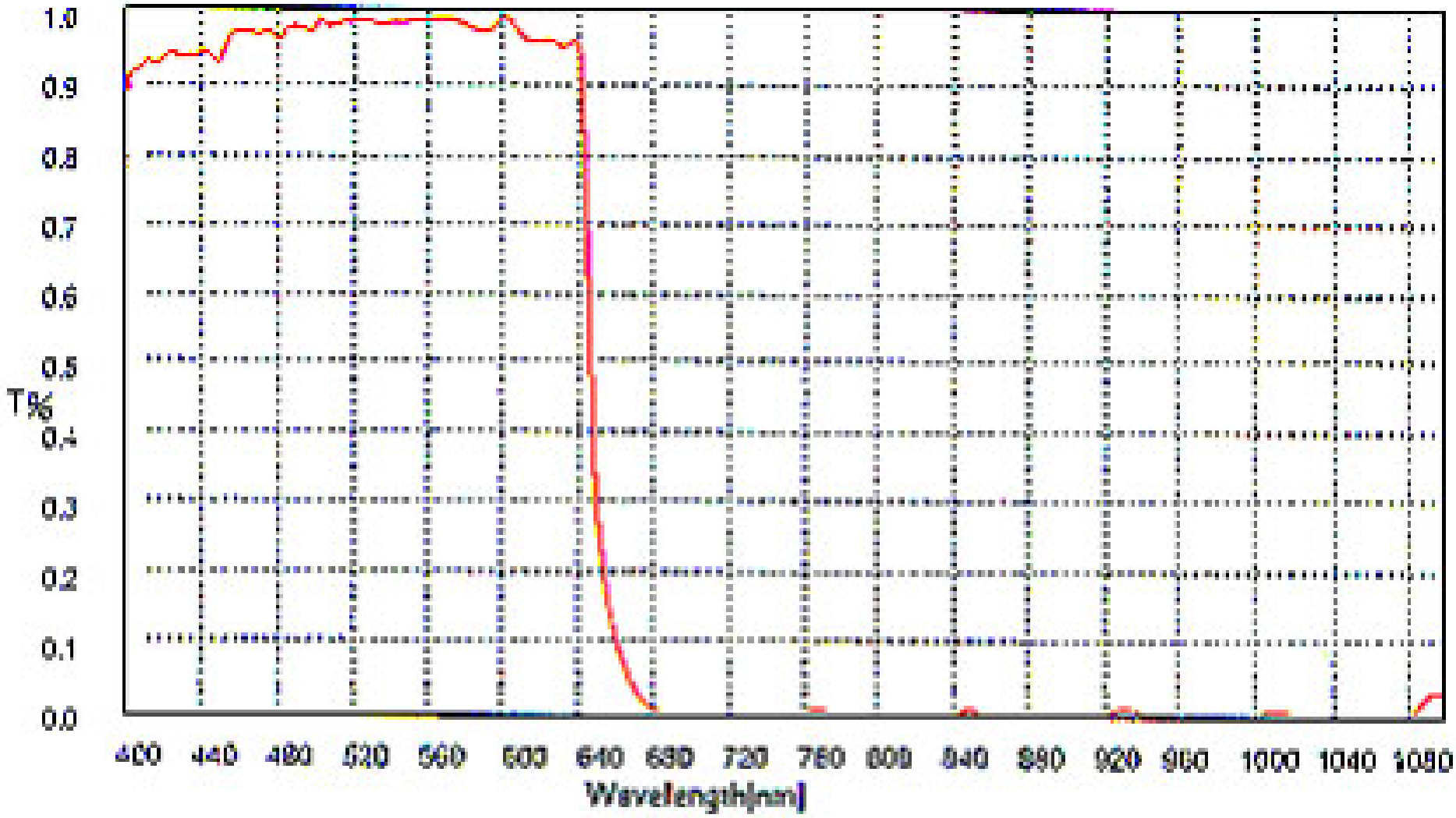


Transmittance Curves for Optical Filters

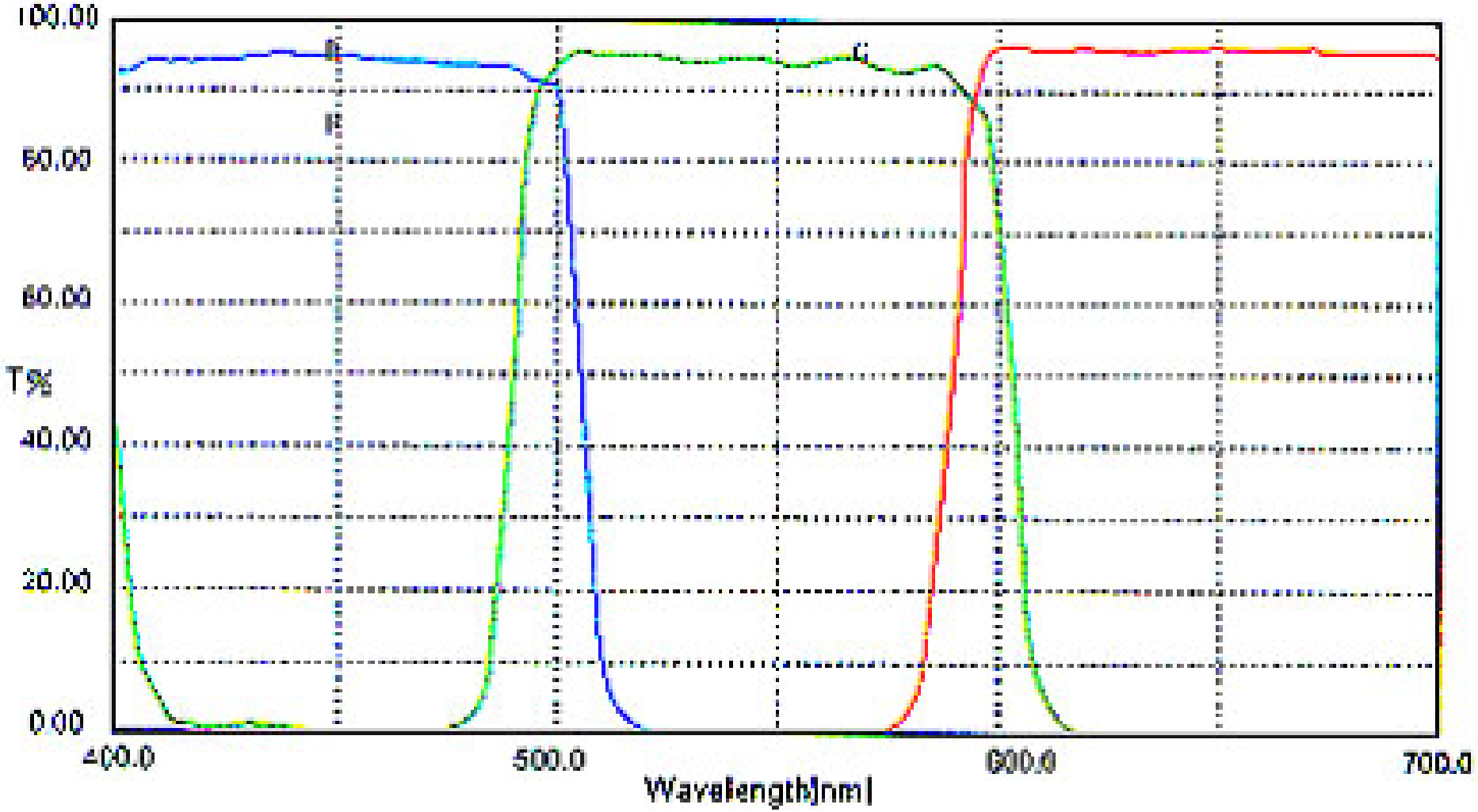


- Absorption filters are also known as bandpass filters
- Usually exhibit low peak transmittance
- Typically have a broad peak profile
- Can use two or more absorption filters together to produce desired transmittance characteristics
- Generic filters are 2 x 2 inch glass or quartz
- Relatively inexpensive

Cut-off filters or sharp-cut filters are also available such as the 650 nm cut-off filter shown here
Cut-on filters have reverse profile

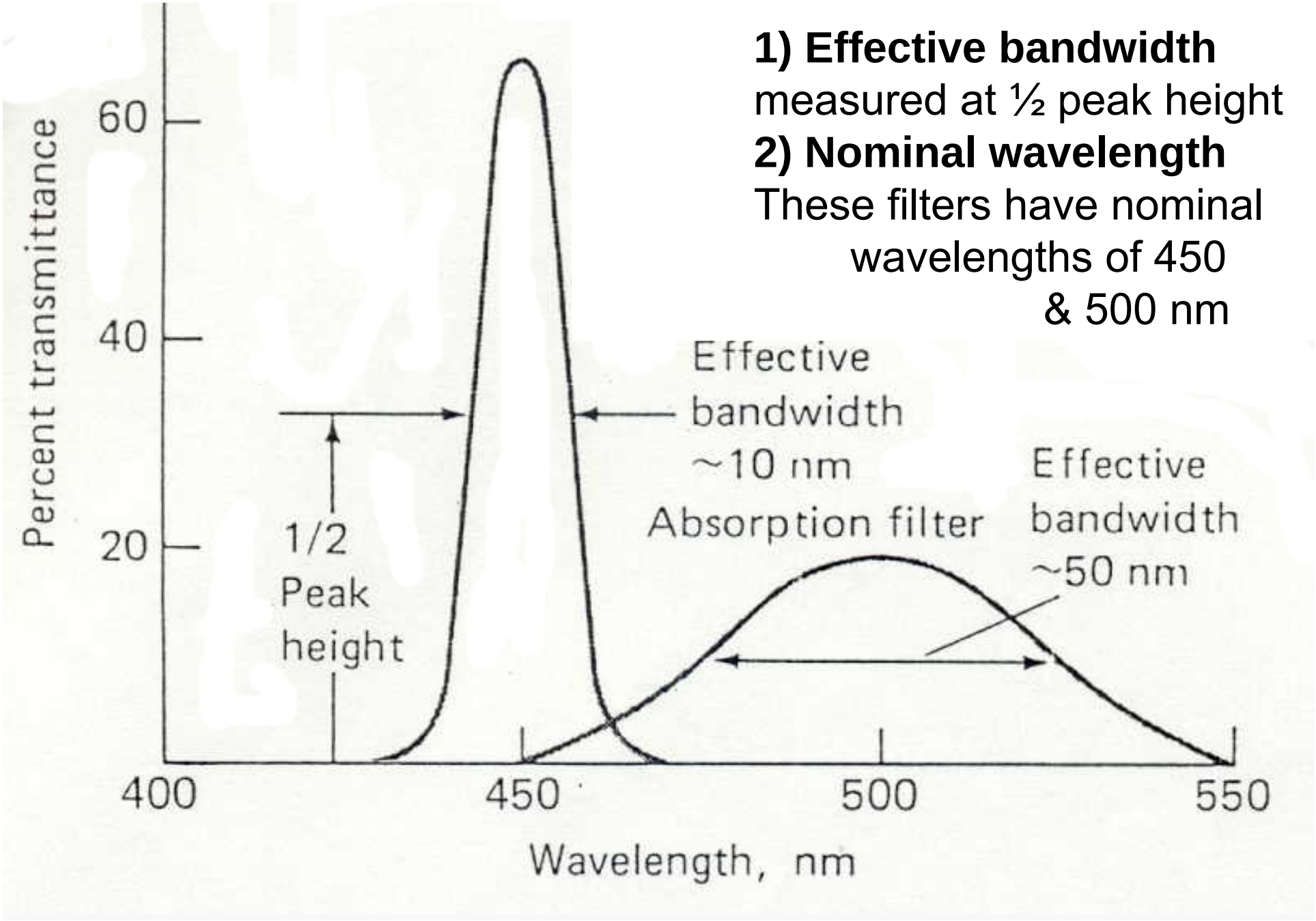


Combining two appropriate cut-off filters produces a bandpass filter. The example shown here comes from 3 filters producing bands at 500 & 600 nm.

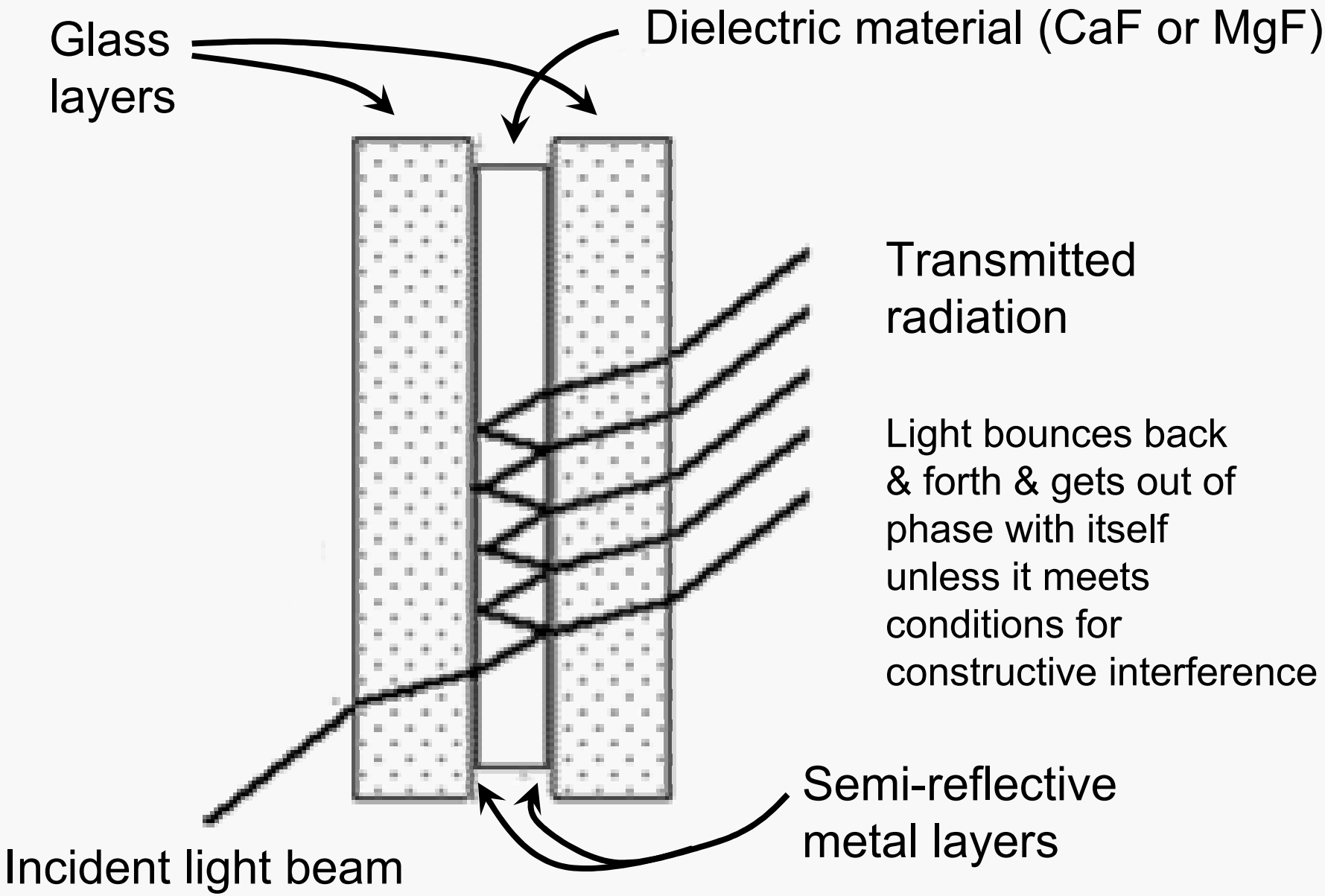


Two terms associated with optical filters are:

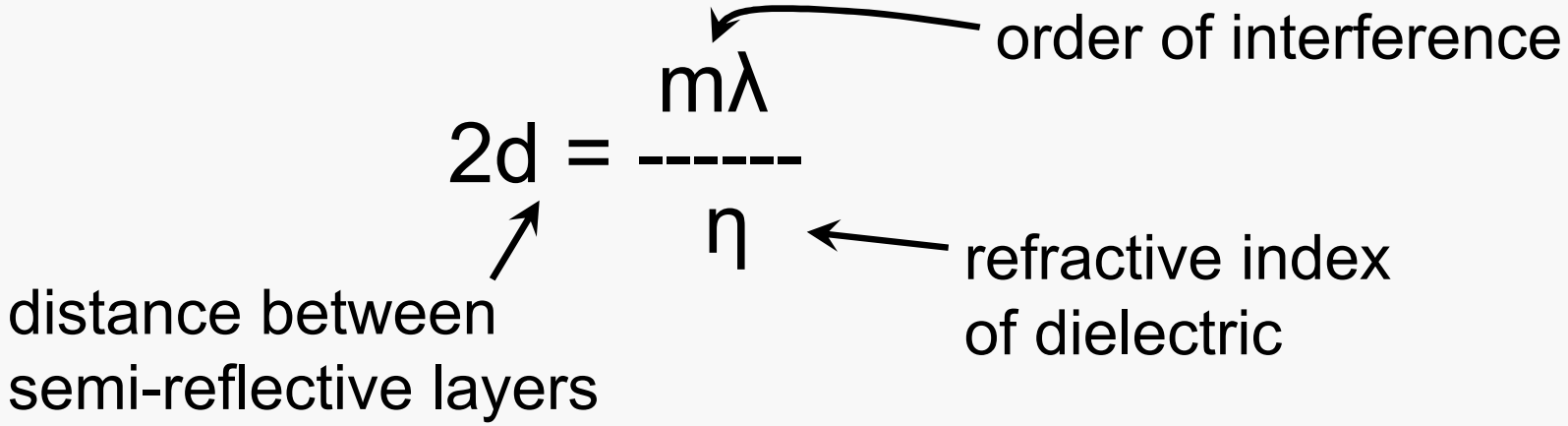
1) Effective bandwidth
measured at ½ peak height
2) Nominal wavelength
These filters have nominal wavelengths of 450 & 500 nm



2) **Interference filters** – usually Fabrey-Perot type

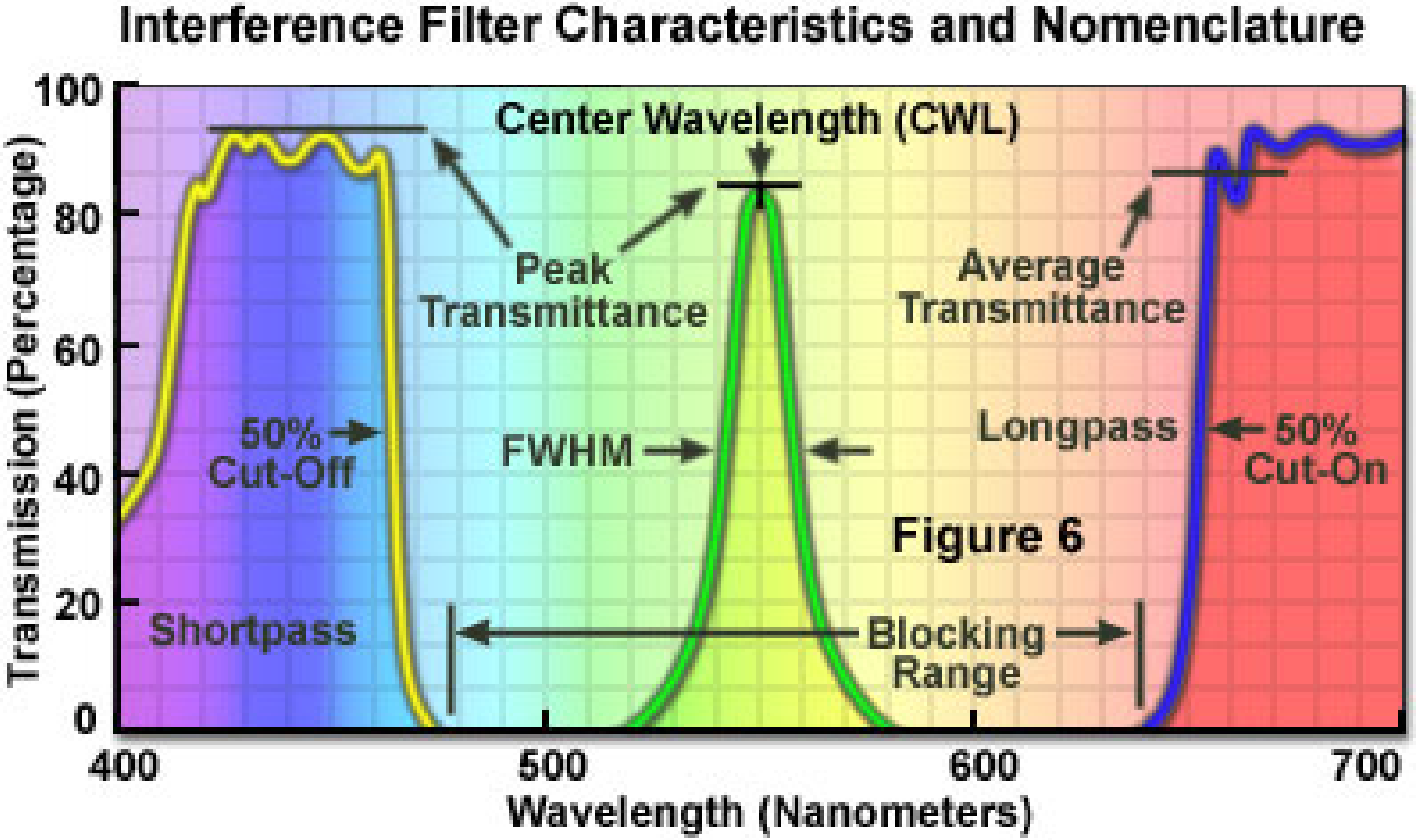


Condition for constructive interference



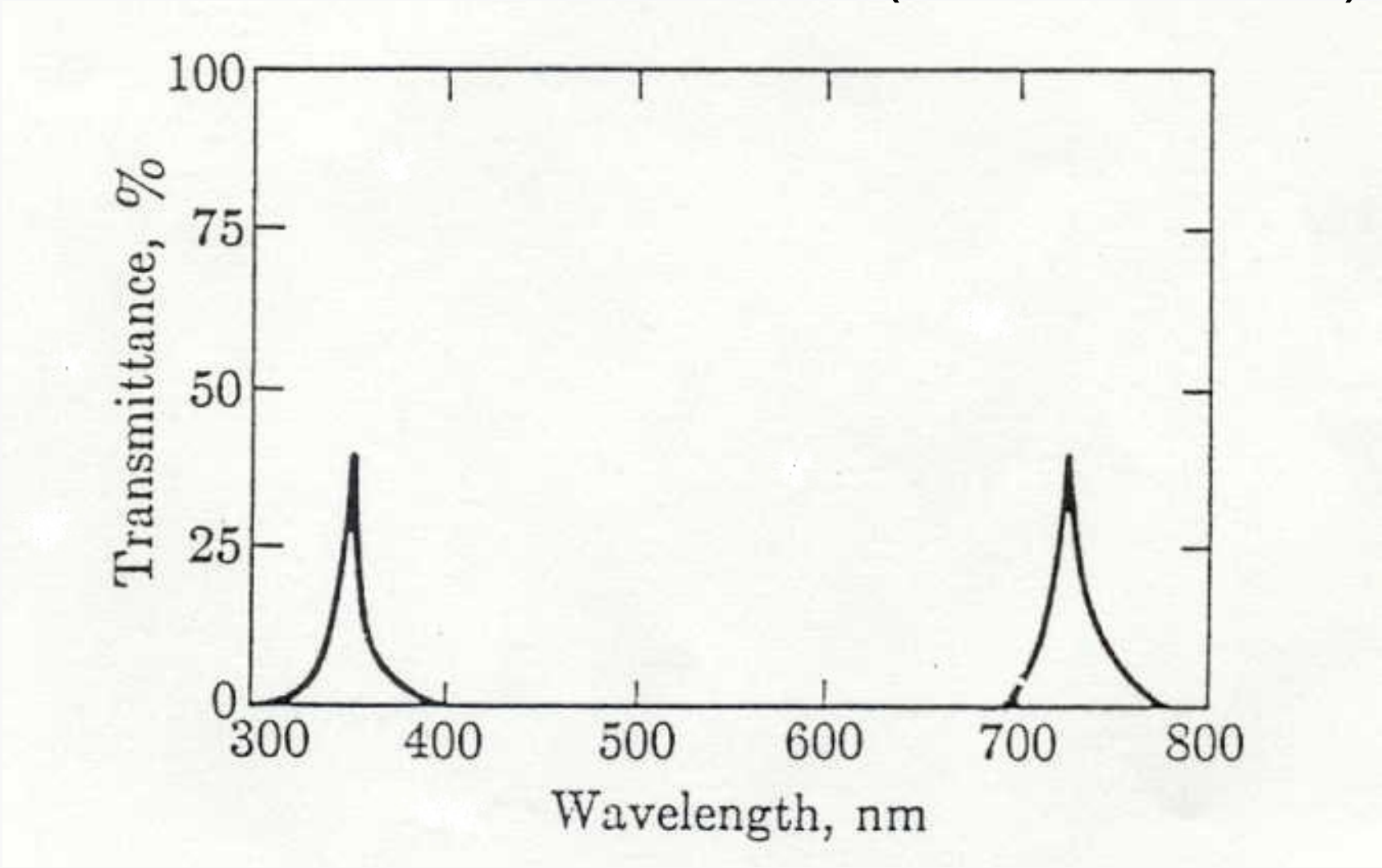
If distance (d) is multiple (m) of wavelength (λ) then it won't be interfered with

Concept of Order – constructive & destructive interference causes waves with different phase angles to be eliminated except if they are multiples of each other

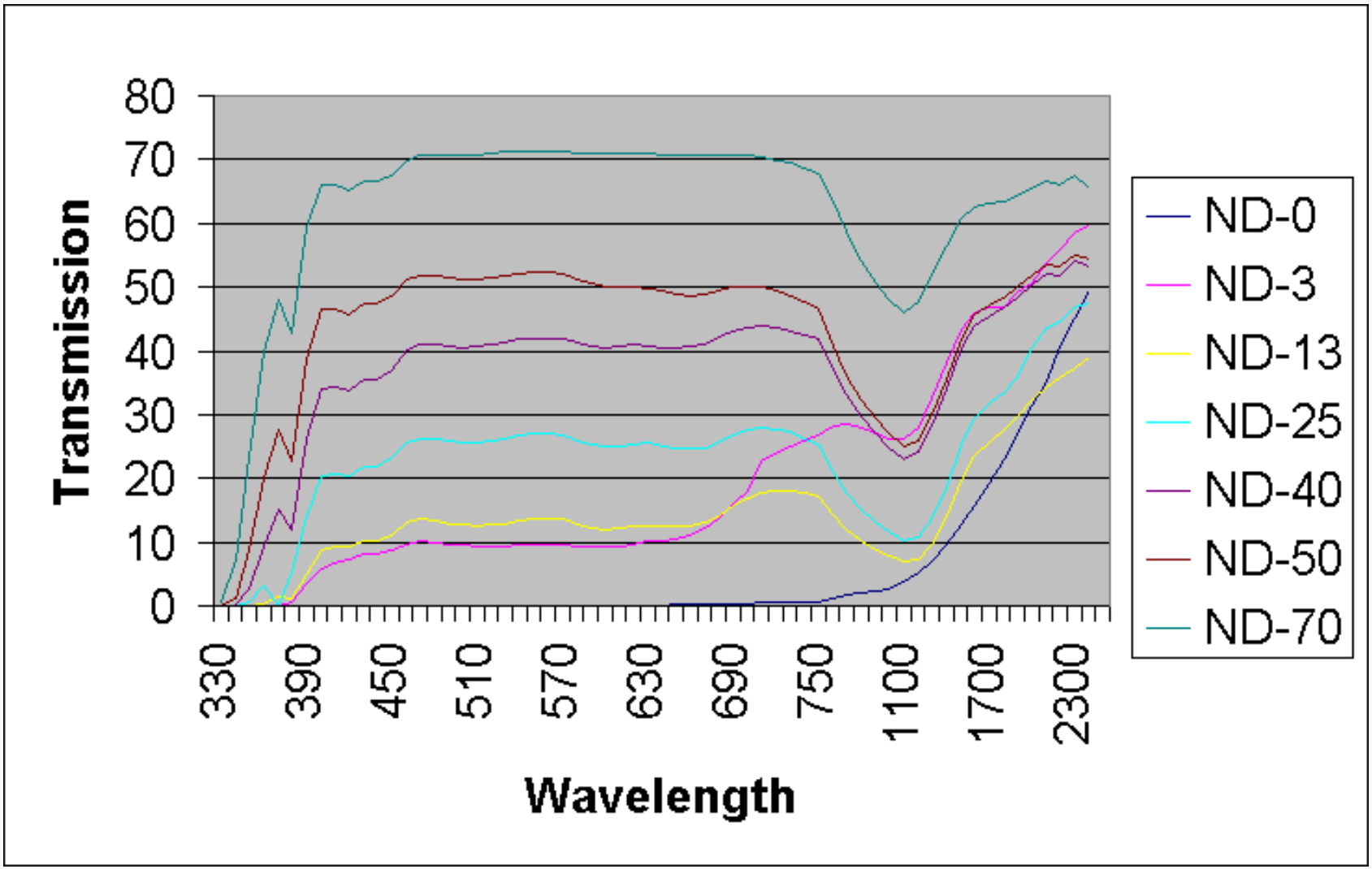


FWHM – full width at half maximum

Transmittance vs. wavelength for typical Fabrey-Perot Interference filter showing first and second order λ's (m = 1 & m = 2)



3) **Neutral density filters** – reduces intensity without any λ discrimination



- Optical Materials – need optically transparent materials for lenses, prisms & sample cells
- In visible region – can use glass down to 350 nm
- In the UV region – quartz is material of choice
- In the IR region – NaCl, KBr, etc. The heavier the atoms of the salt, the farther into the IR region (i.e., longer λ) before significant absorption occurs

Problem – sensitivity to moisture