Optical Handling and Positioning

Module 1-2

of

Course 1, *Fundamentals of Light and Lasers*

OP-TEC

National Center for Optics and Photonics Education

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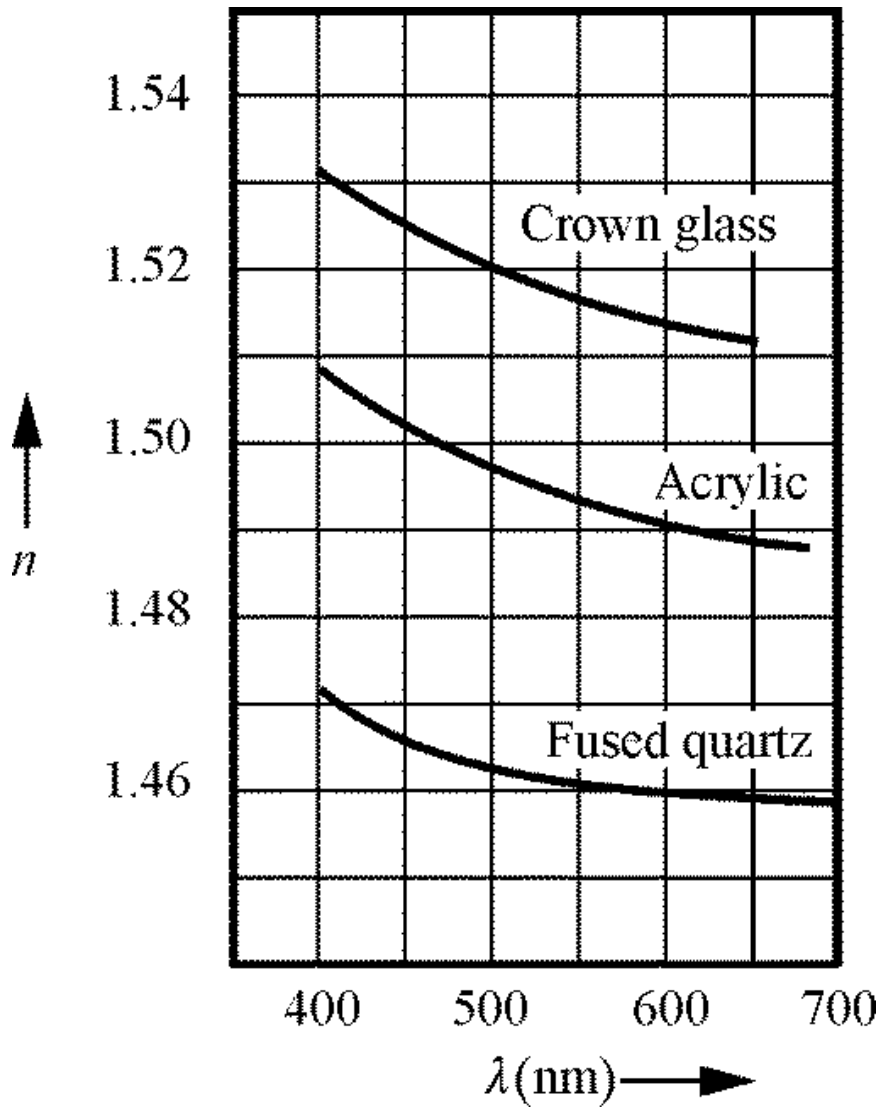


Figure 2-1 *Refractive index of several optical materials as a function of wavelength*

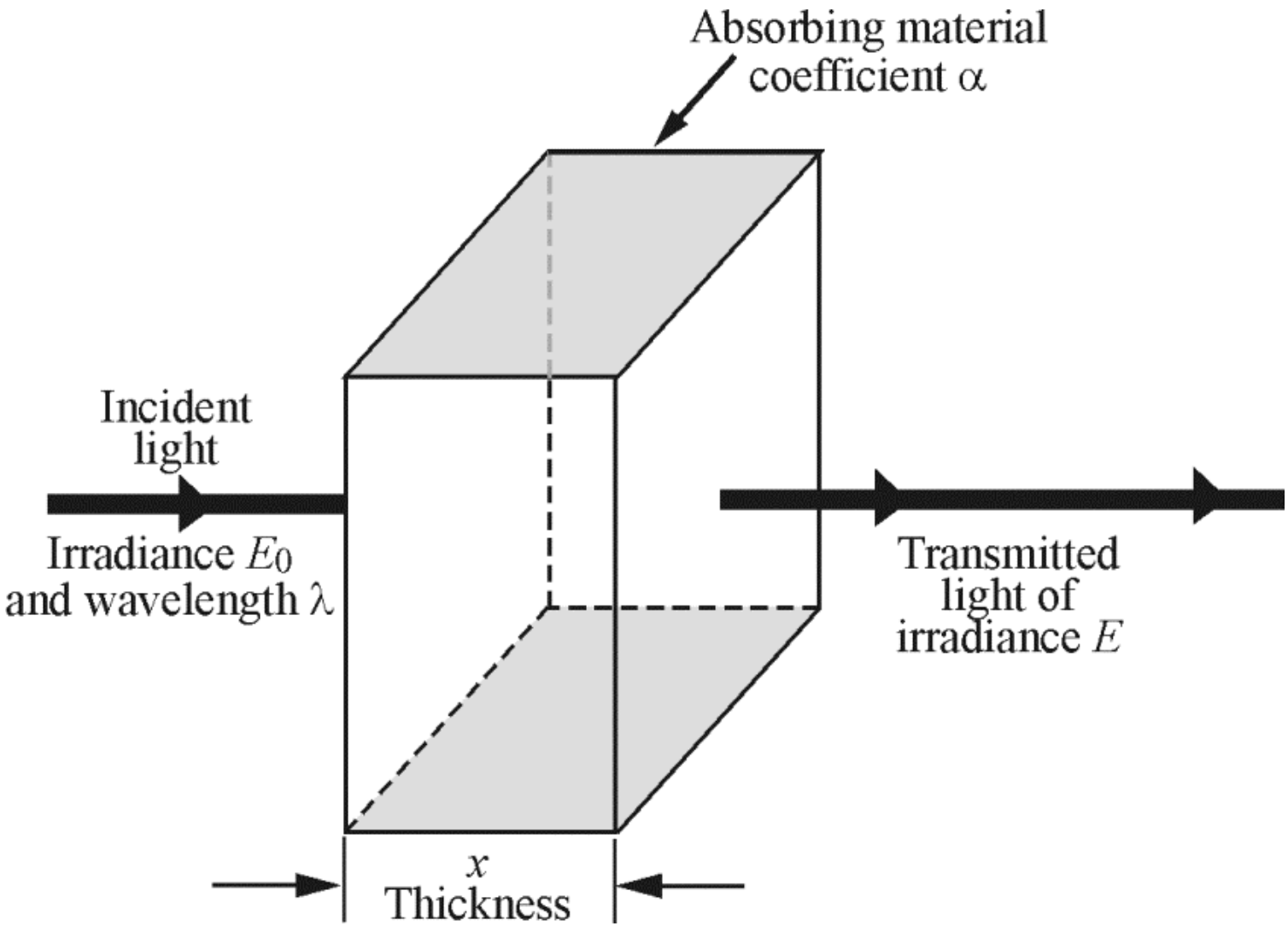


Figure 2-2 *Absorption of light passing through a transparent medium of thickness x*

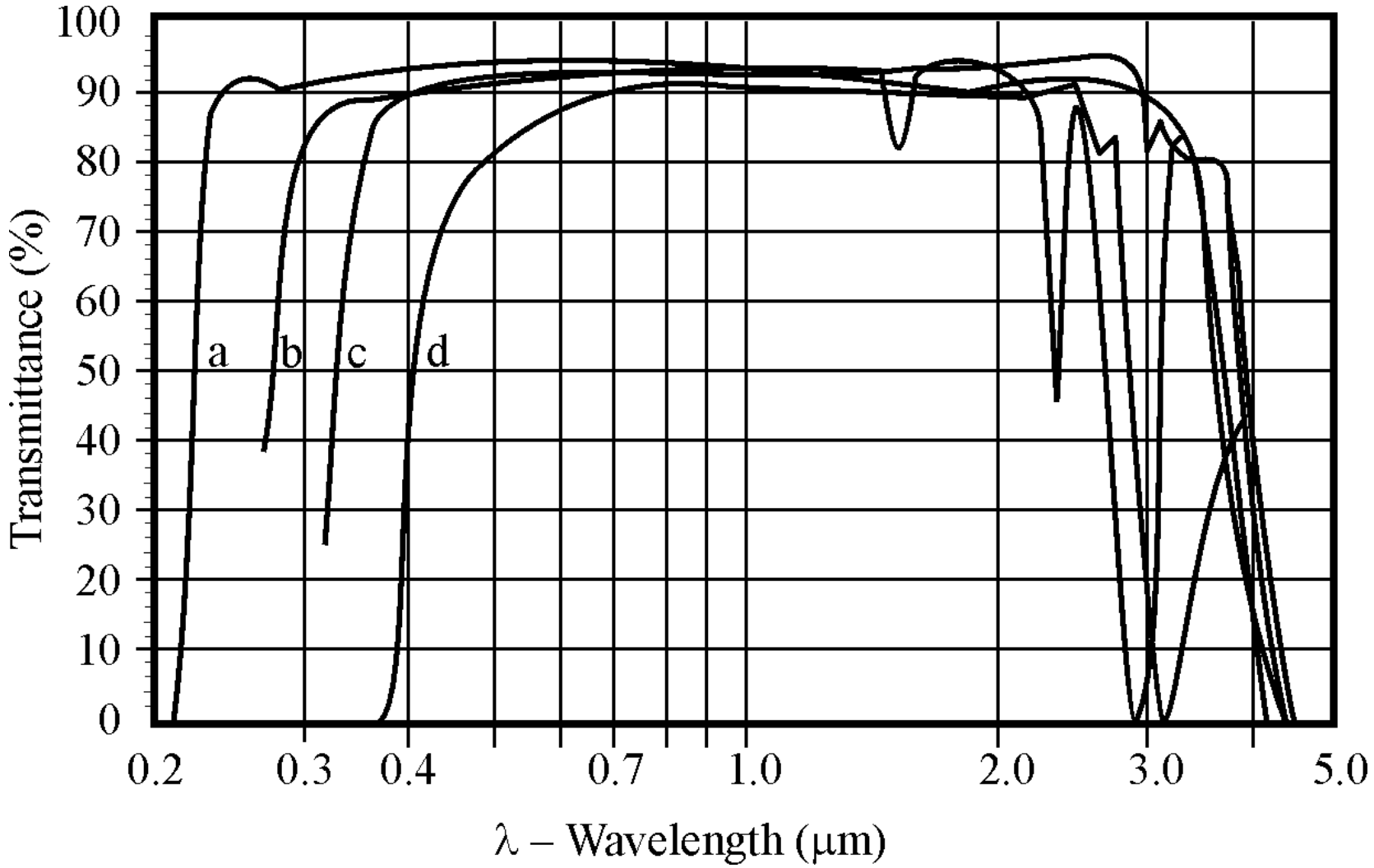


Figure 2-3 *Transmission characteristics of several optical materials: (a) fused silica, (b) fused quartz, (c) Pyrex, and (d) Zerodur (Source: www.escoproducts.com)*

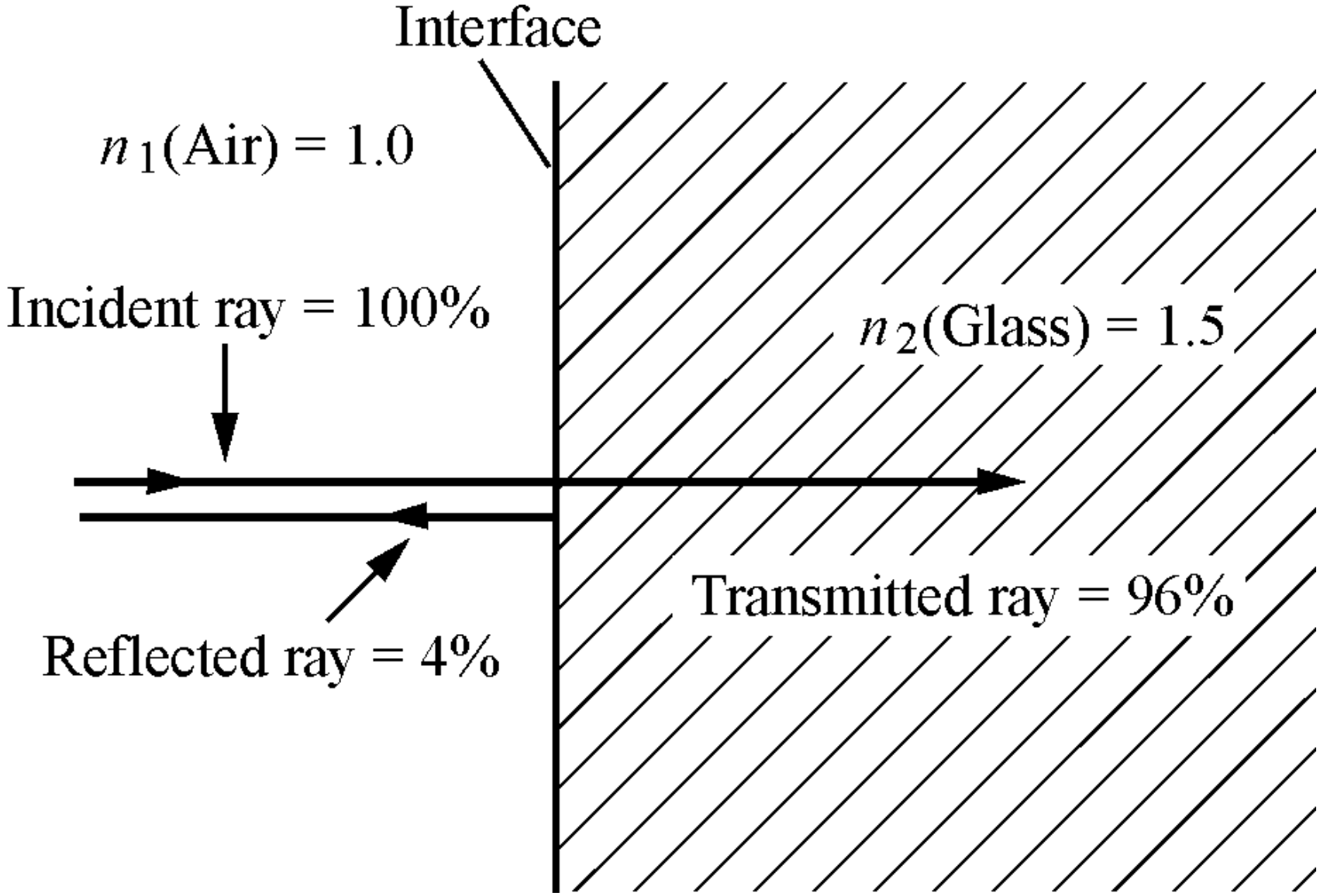


Figure 2-4 *Reflection and transmission of light incident perpendicular to an air-glass interface*

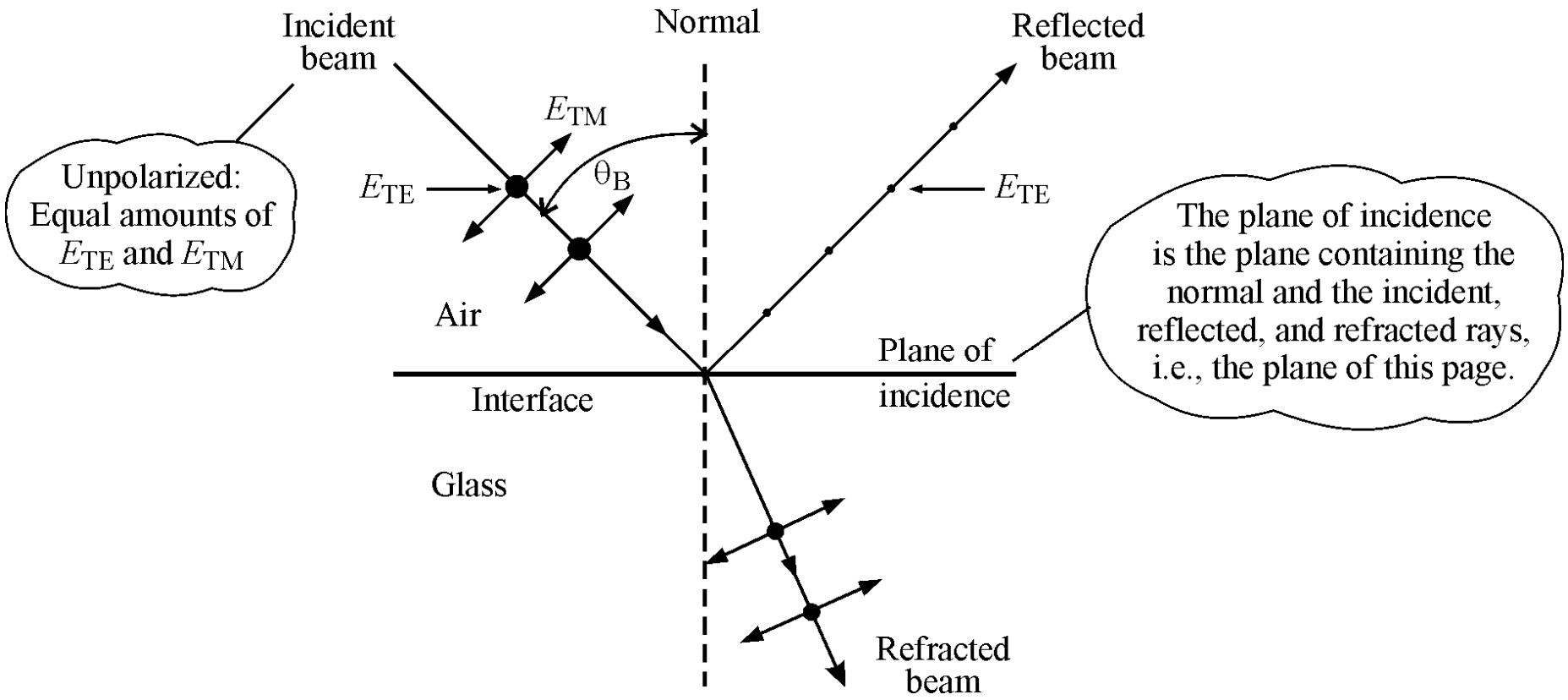


Figure 2-5 *Reflection and refraction of initially unpolarized light containing equal amounts of* E_{TE} *and* E_{TM}

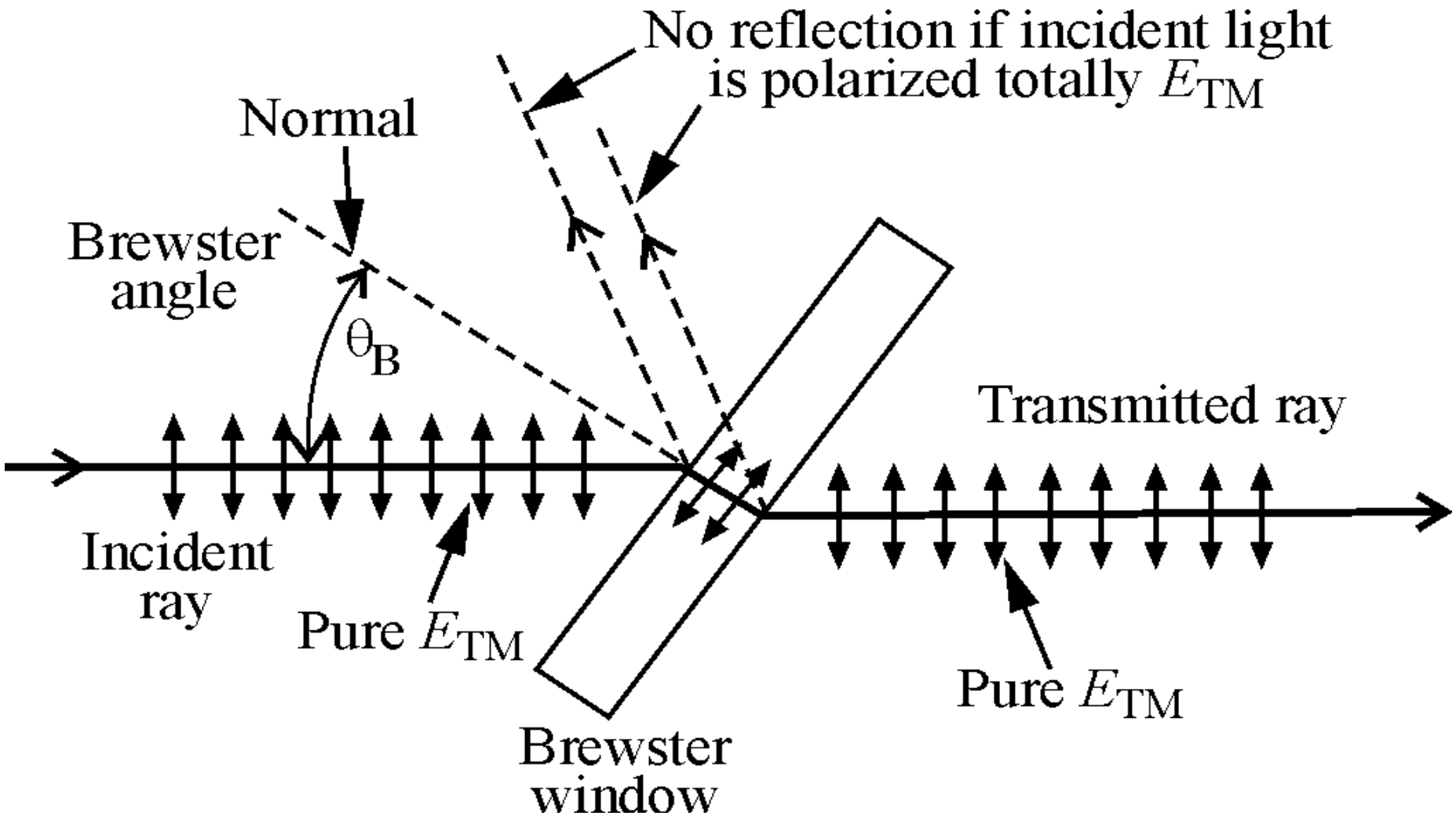


Figure 2-6 *Absence of reflected light at a Brewster angle of incidence when incident light is totally polarized as* E_{TM}

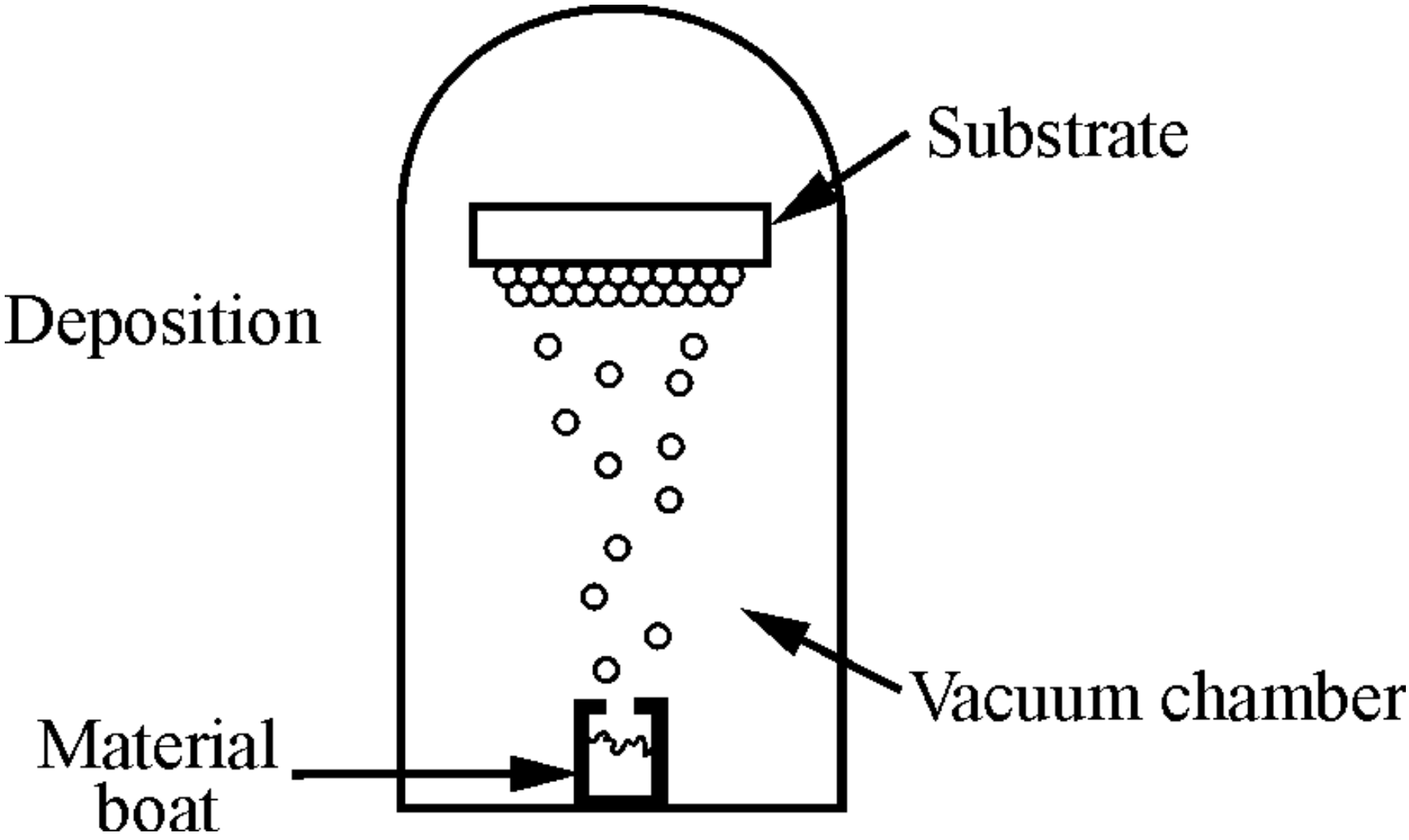


Figure 2-7 *Schematic diagram of a typical vacuum deposition chamber*

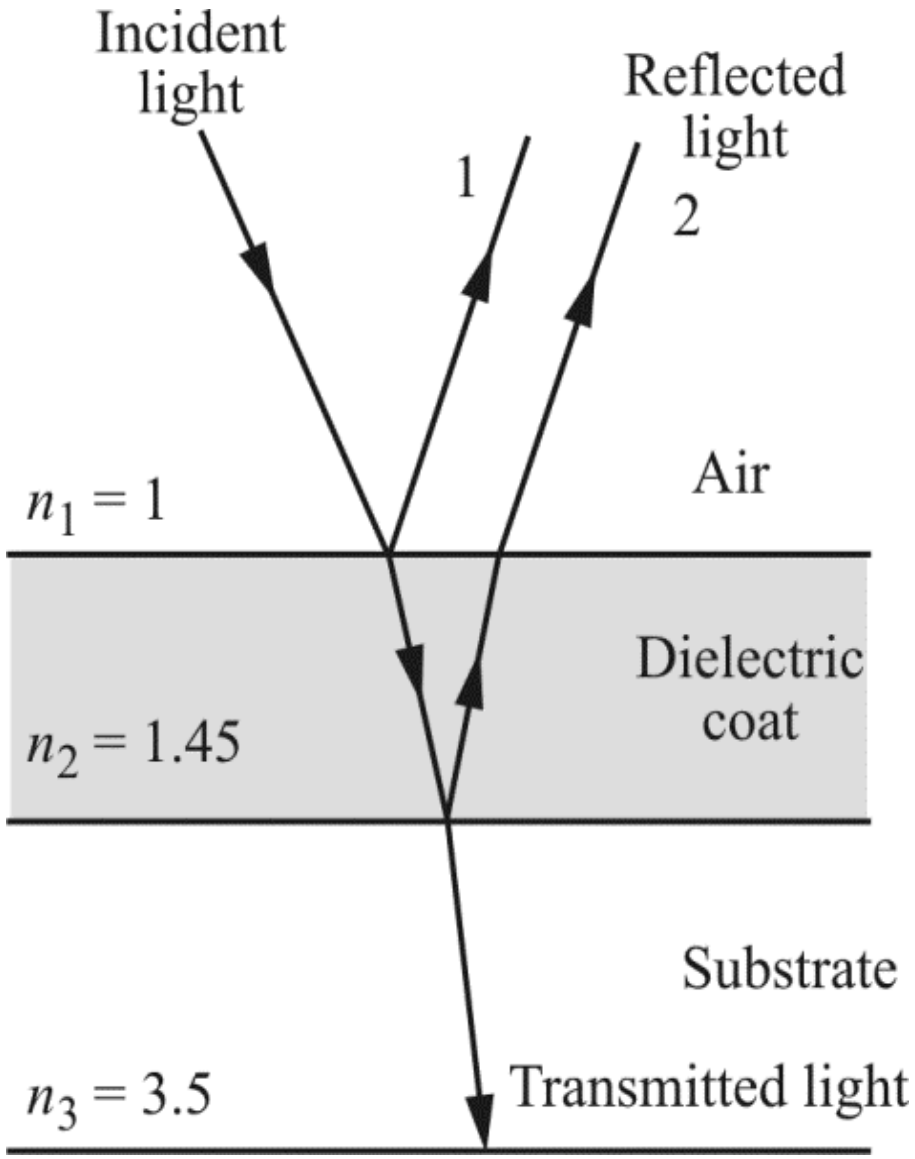


Figure 2-8 *Reflection at multiple interfaces with different refractive indices*

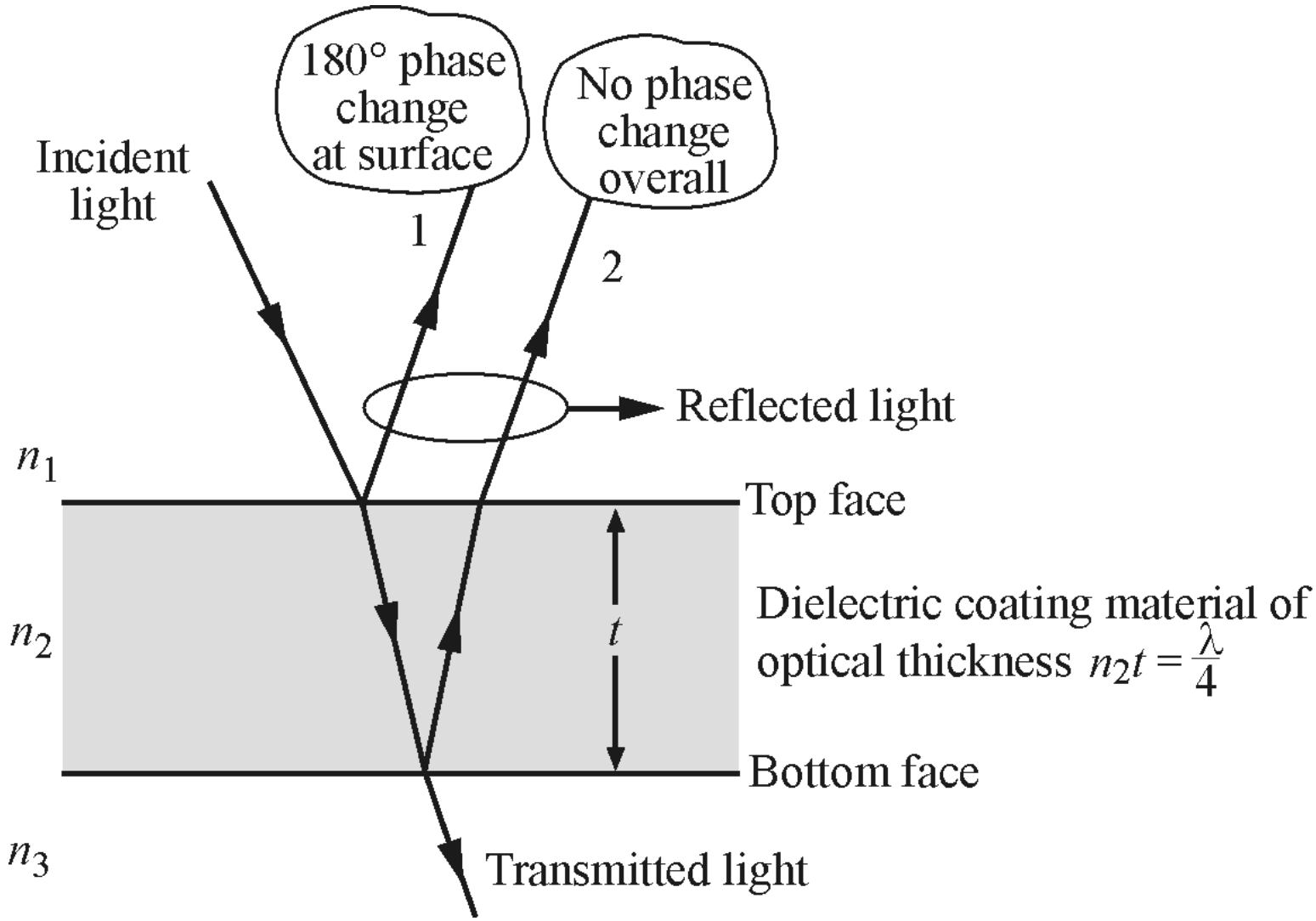


Figure 2-9 *Reflection at top and bottom interfaces of coating material. Reflected rays 1 and 2 are 180 ^{o} out of phase, leading to destructive interference and little or no reflected light.*

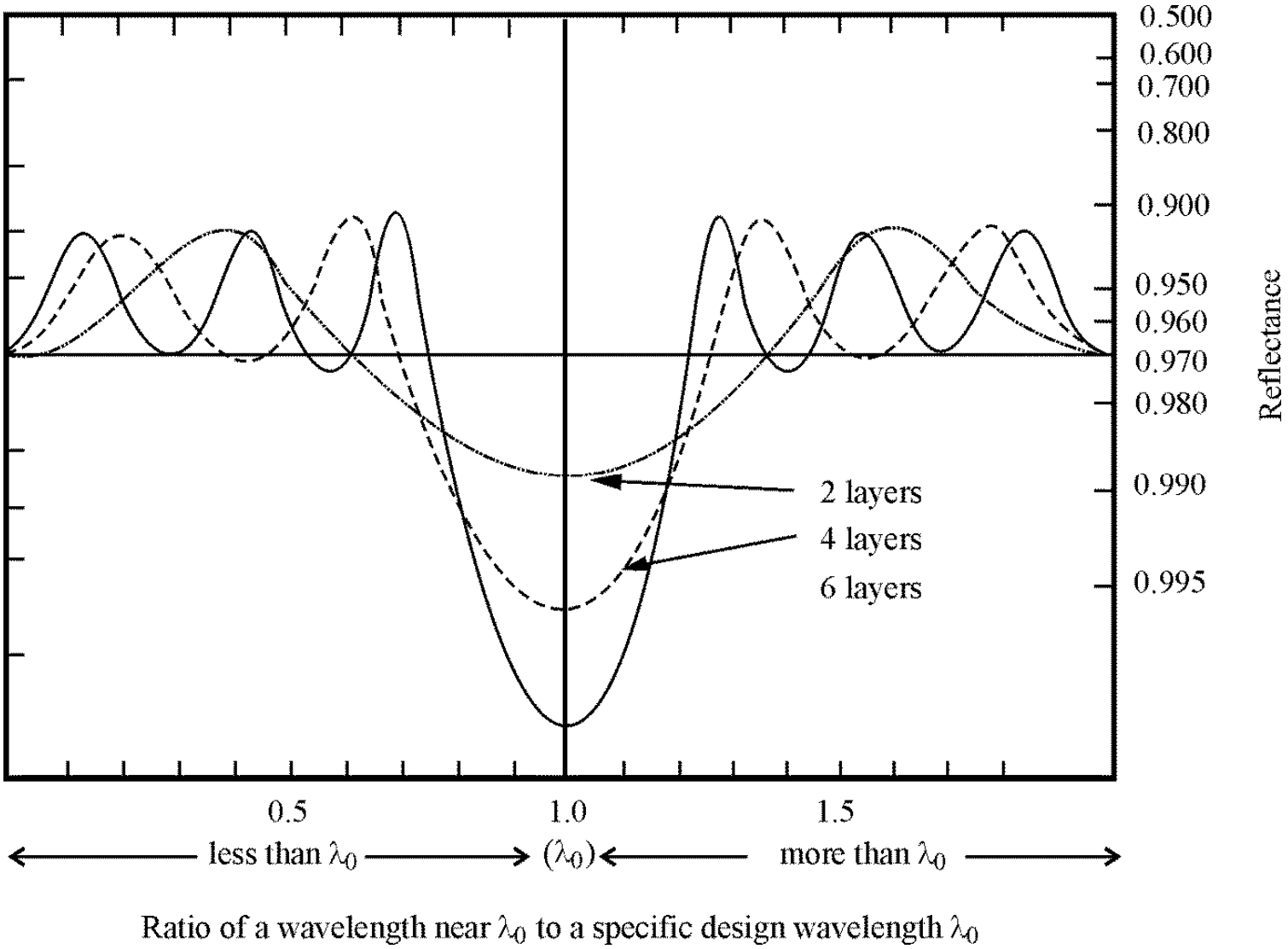


Figure 2-10 *Increase of reflectivity at a specific wavelength λ after reflection at multiple layers of coating*

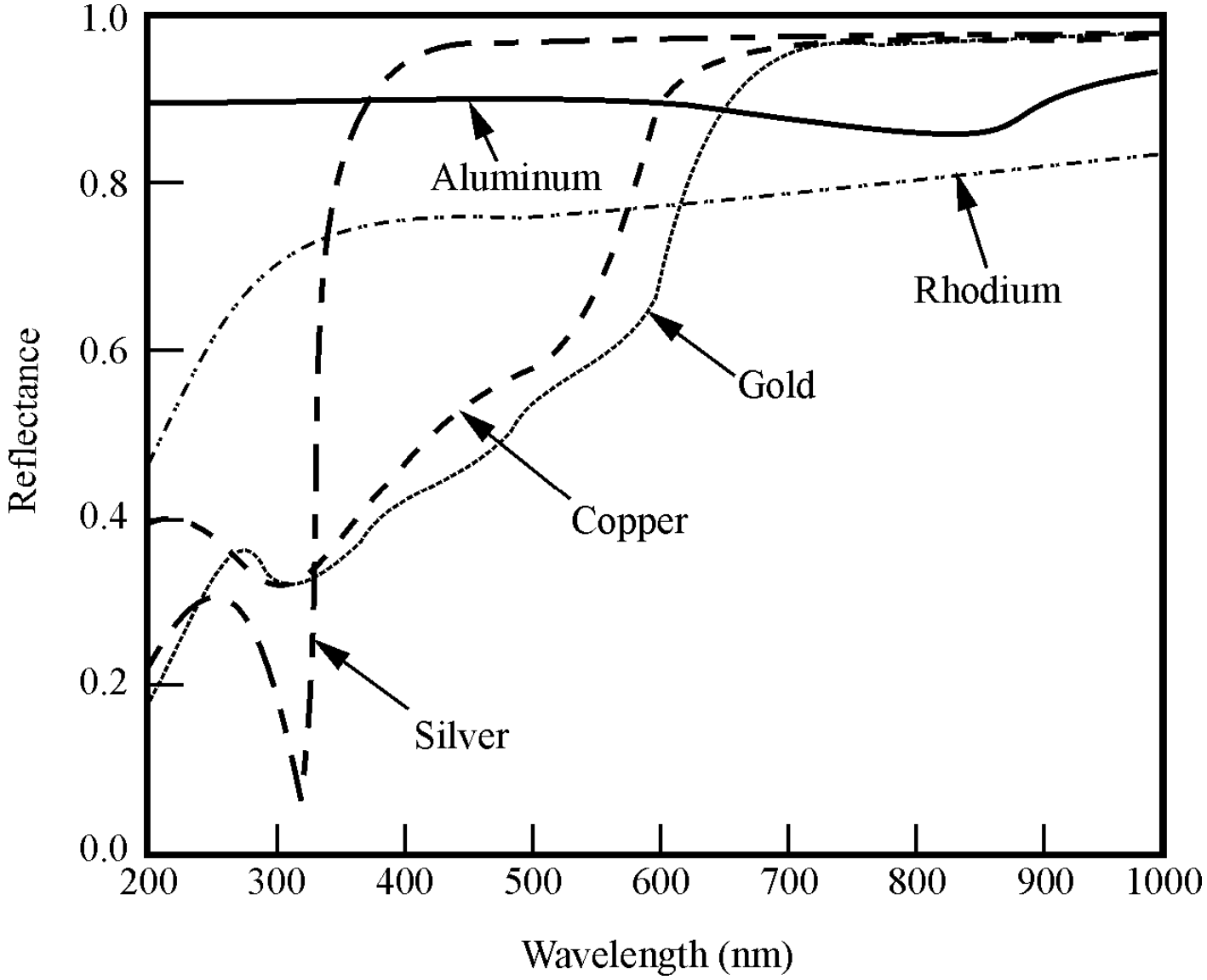


Figure 2-11 *Reflectance of some metals as a function of wavelength*

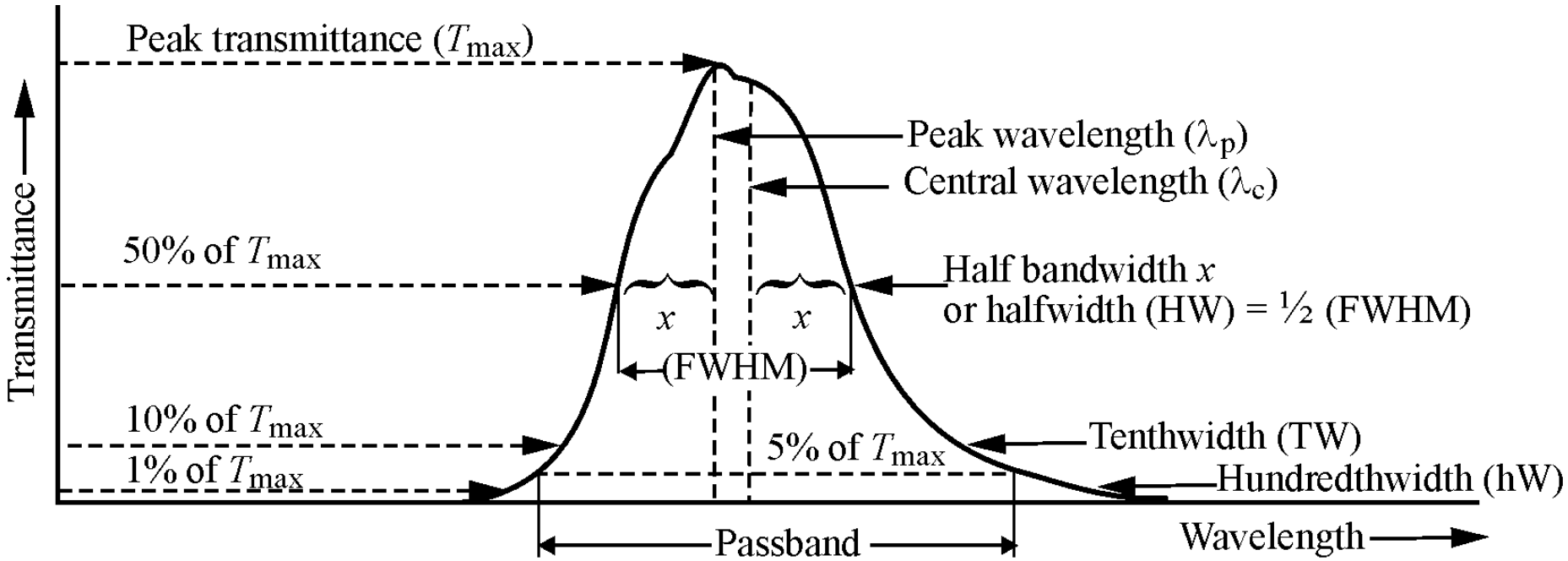


Figure 2-12 *Properties of a band pass filter*

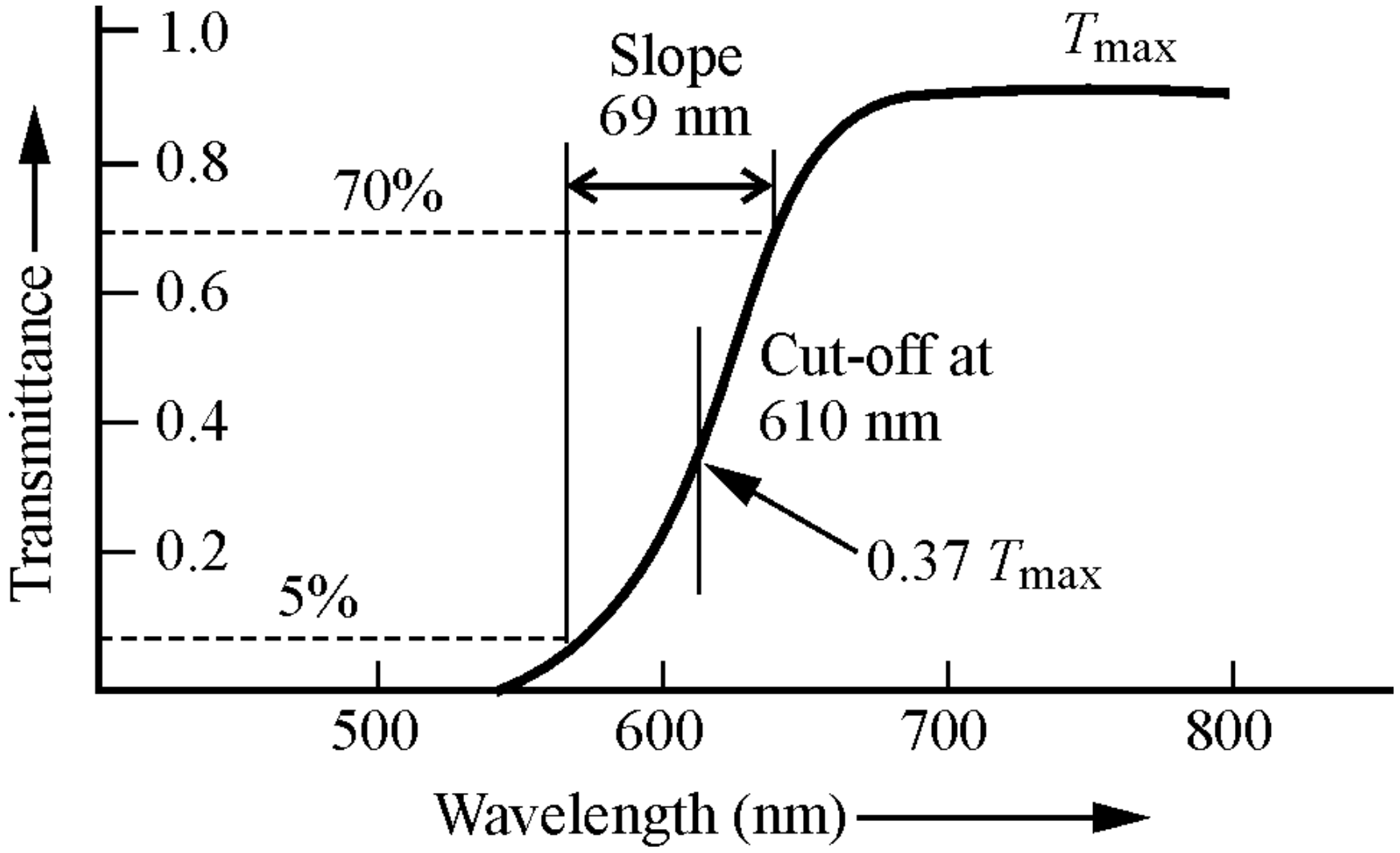


Figure 2-13 *Properties of a high pass cut-off filter*

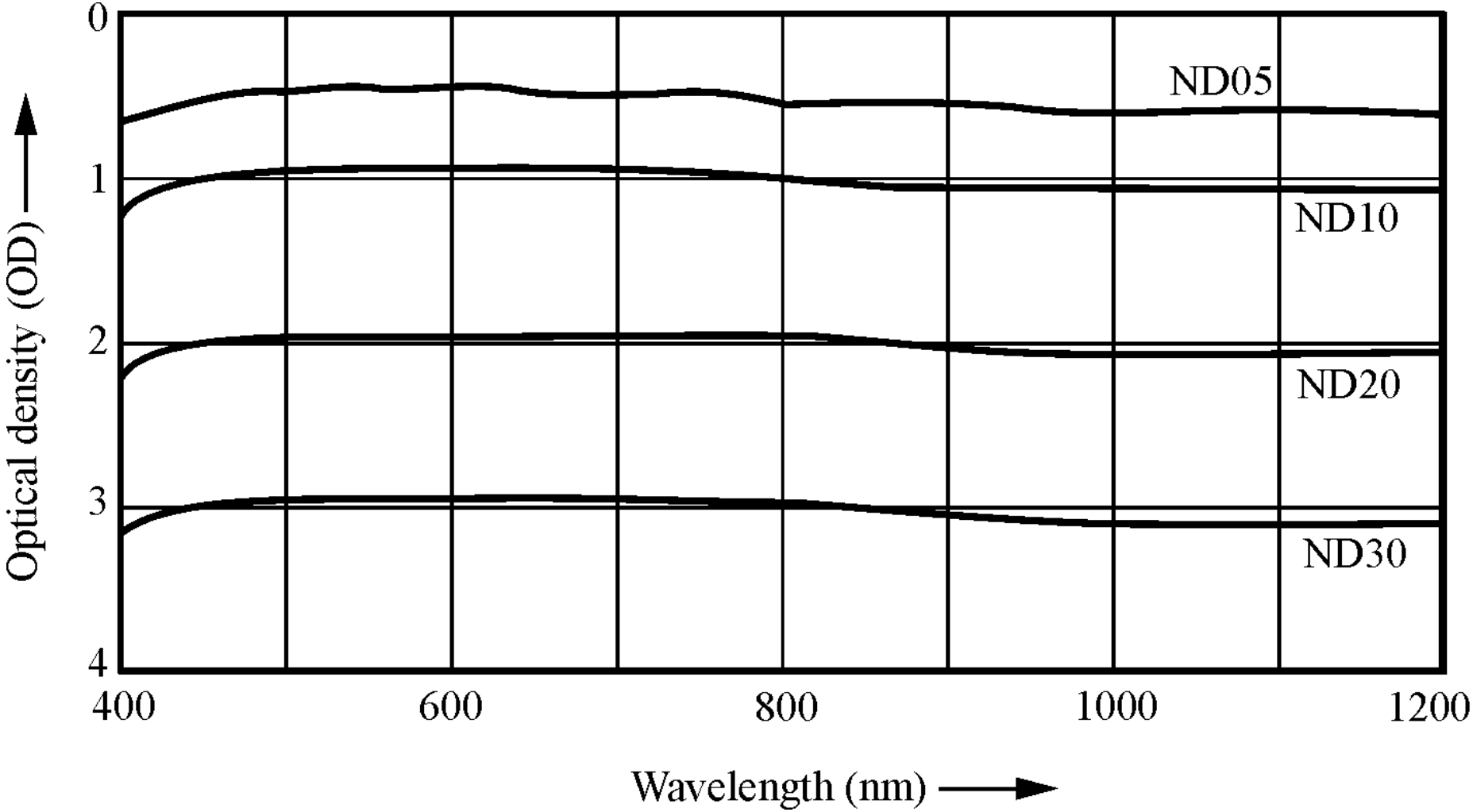


Figure 2-14 *Optical densities of some neutral-density filters*

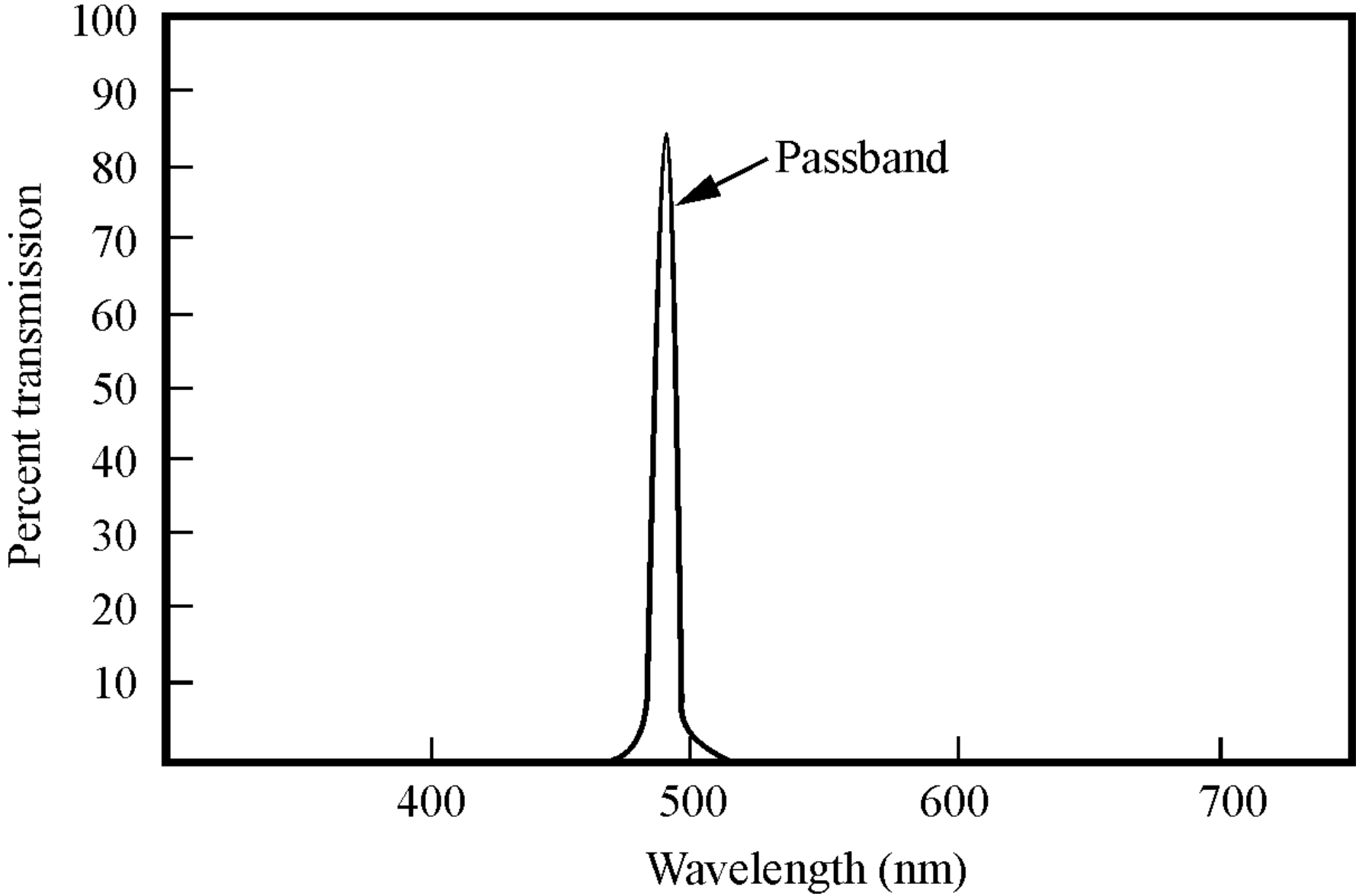


Figure 2-15 *Percentage of transmission of a specific narrow-band filter*

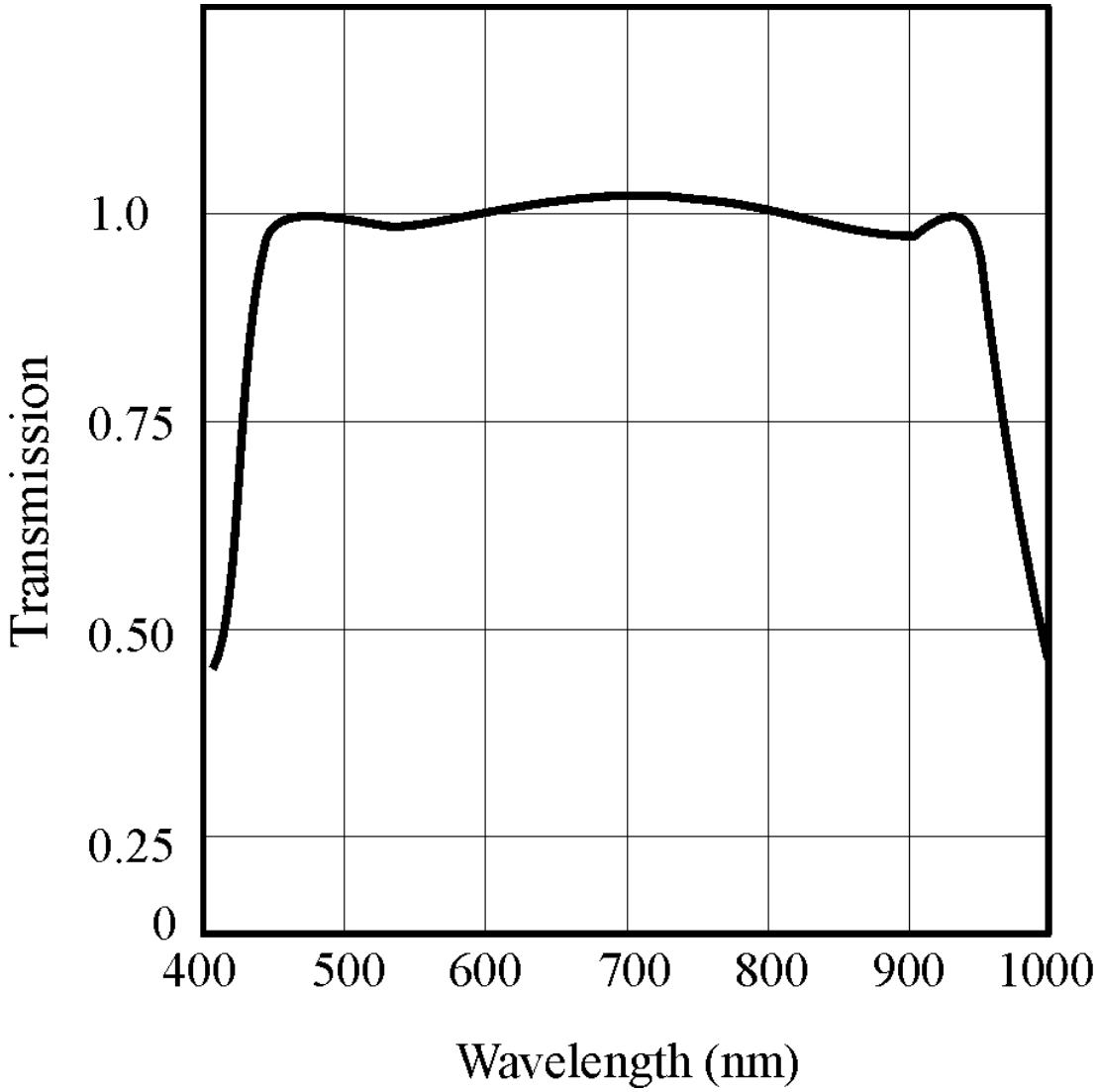


Figure 2-16 *Transmission characteristics of a radiometric filter showing a nearly uniform transmission between 400 nm and 1000 nm (Image as revised in Fundamentals of Light and Lasers, 3rd Edition)*

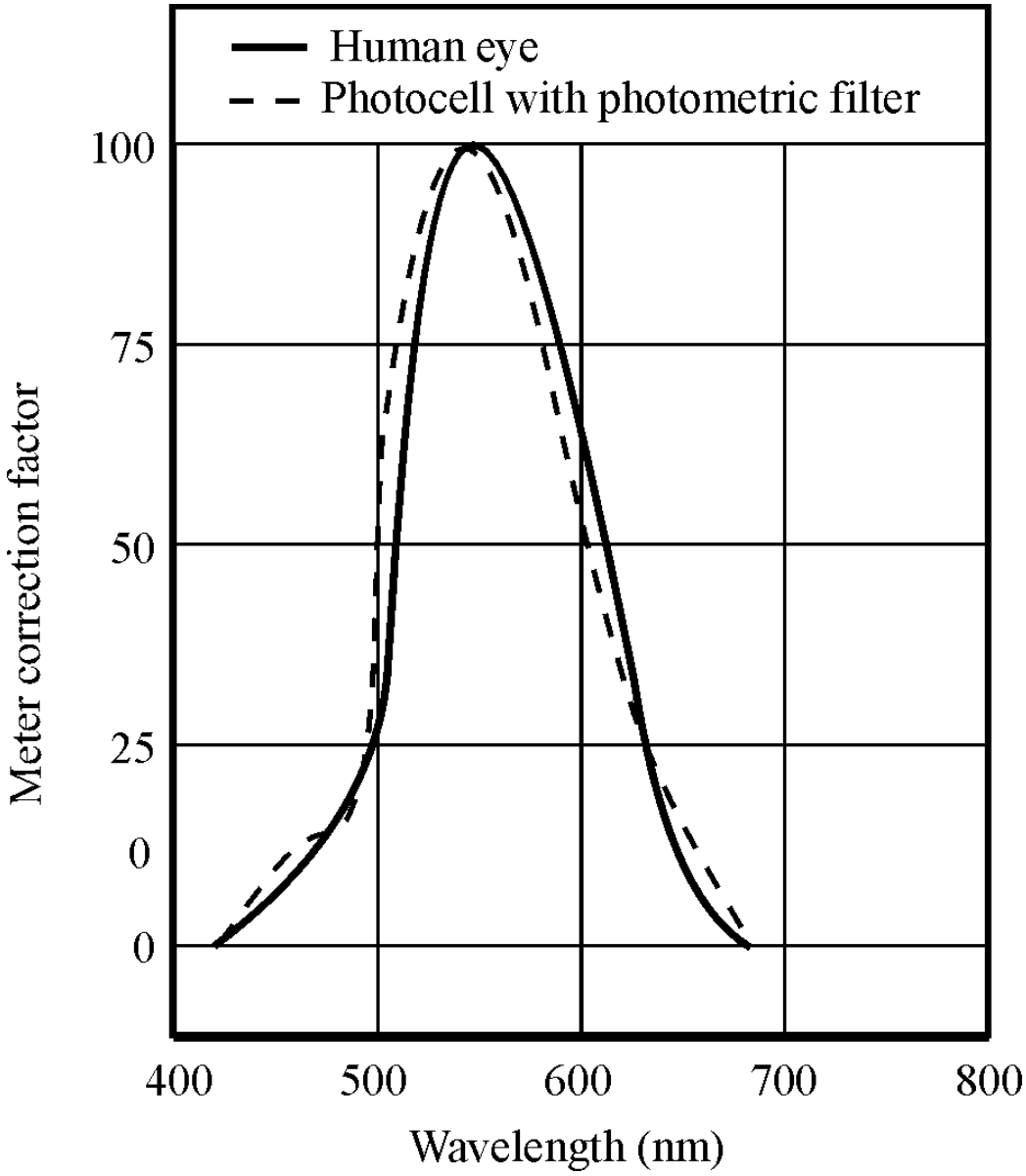


Figure 2-17 *Transmission characteristics of a photometric filter*

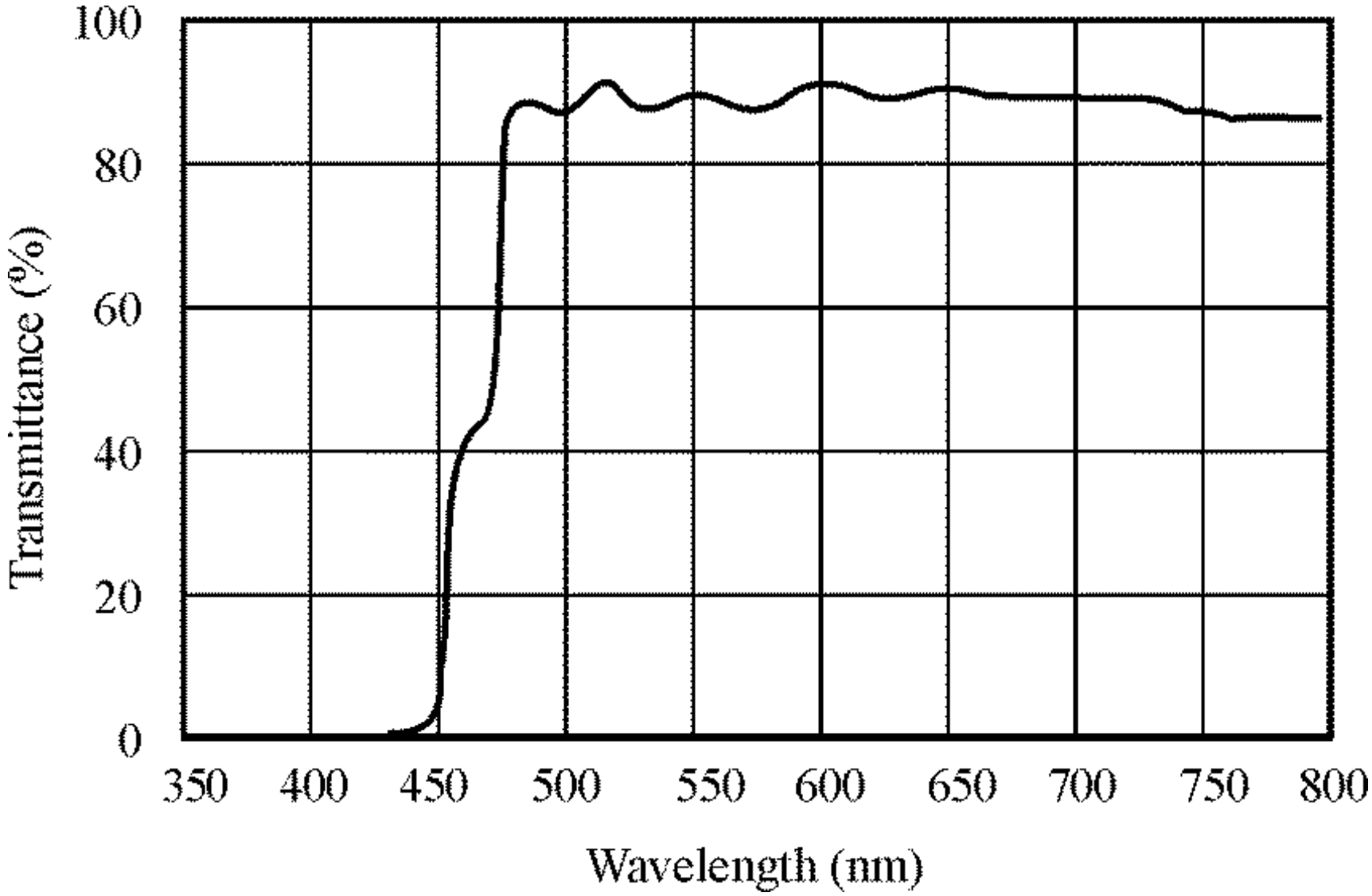


Figure 2-18 *Transmission characteristics of a safety goggle suitable for protection from CO_2 laser beams*

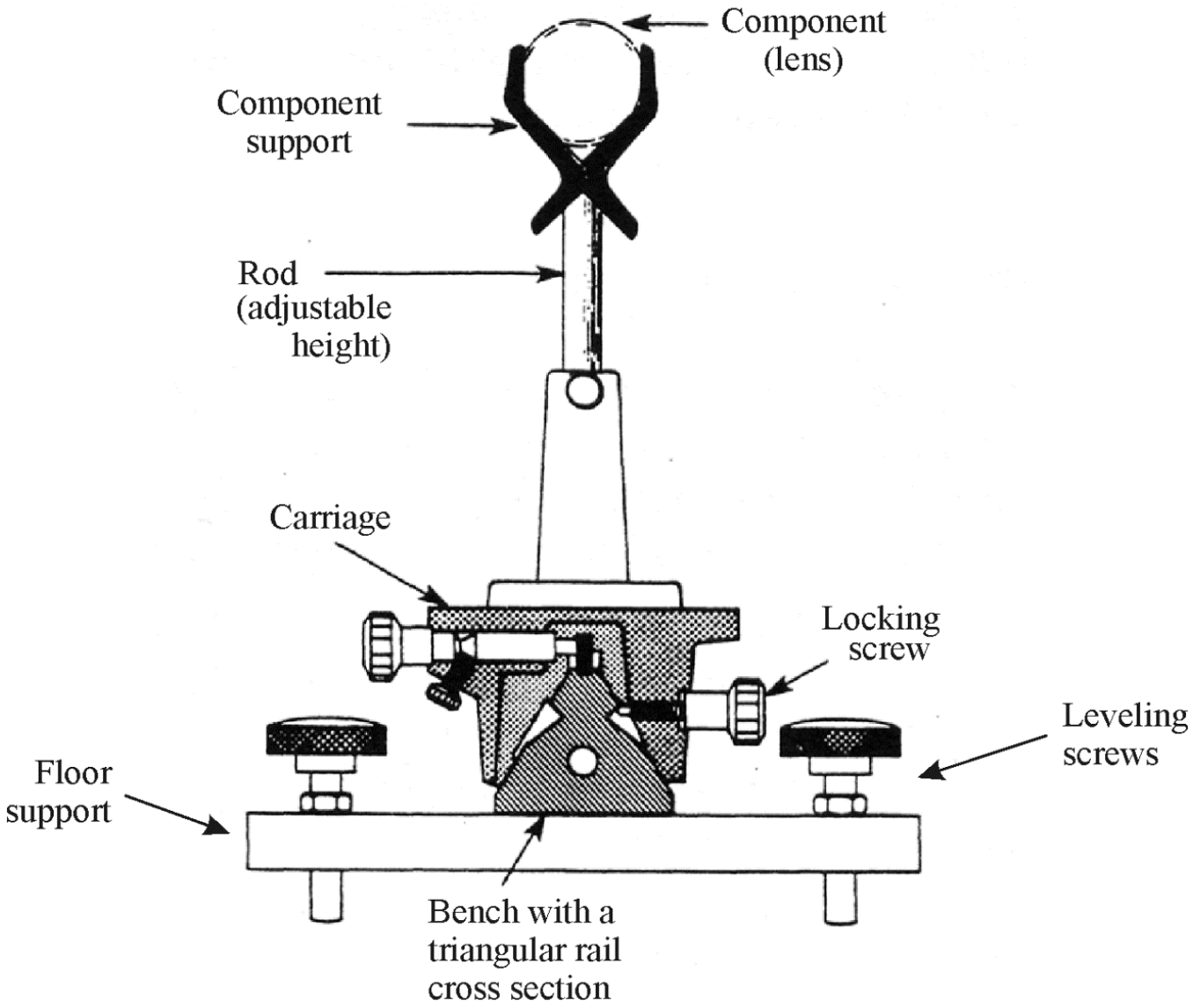


Figure 2-19 *Cross-sectional view of a triangular optical rail with carriage, adjustable rod, lens support and lens*

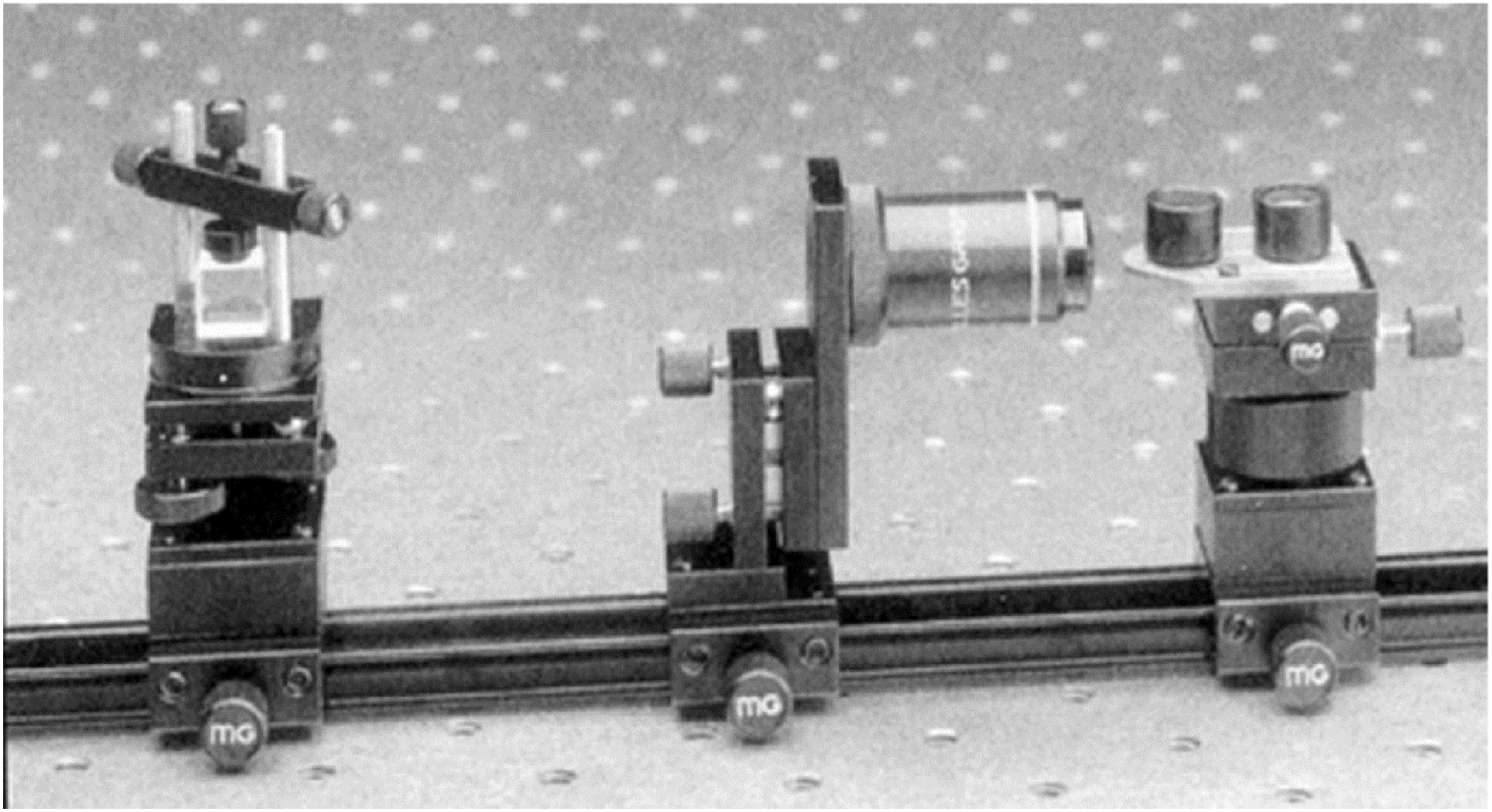


Figure 2-20 *Double rectangular optical rail*
(Courtesy: Newport Corporation)

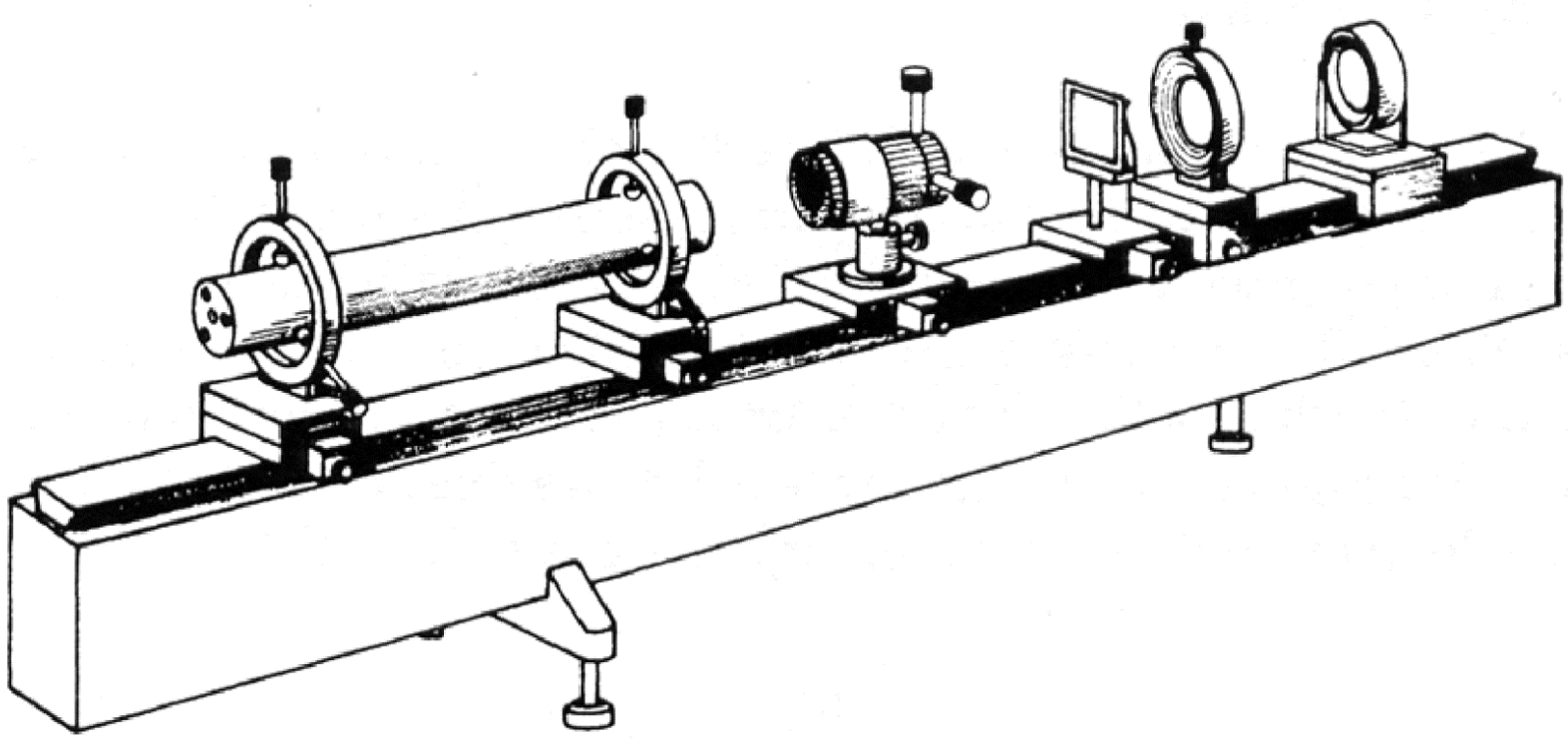


Figure 2-21 *Flat-bed bench for optical mounting*

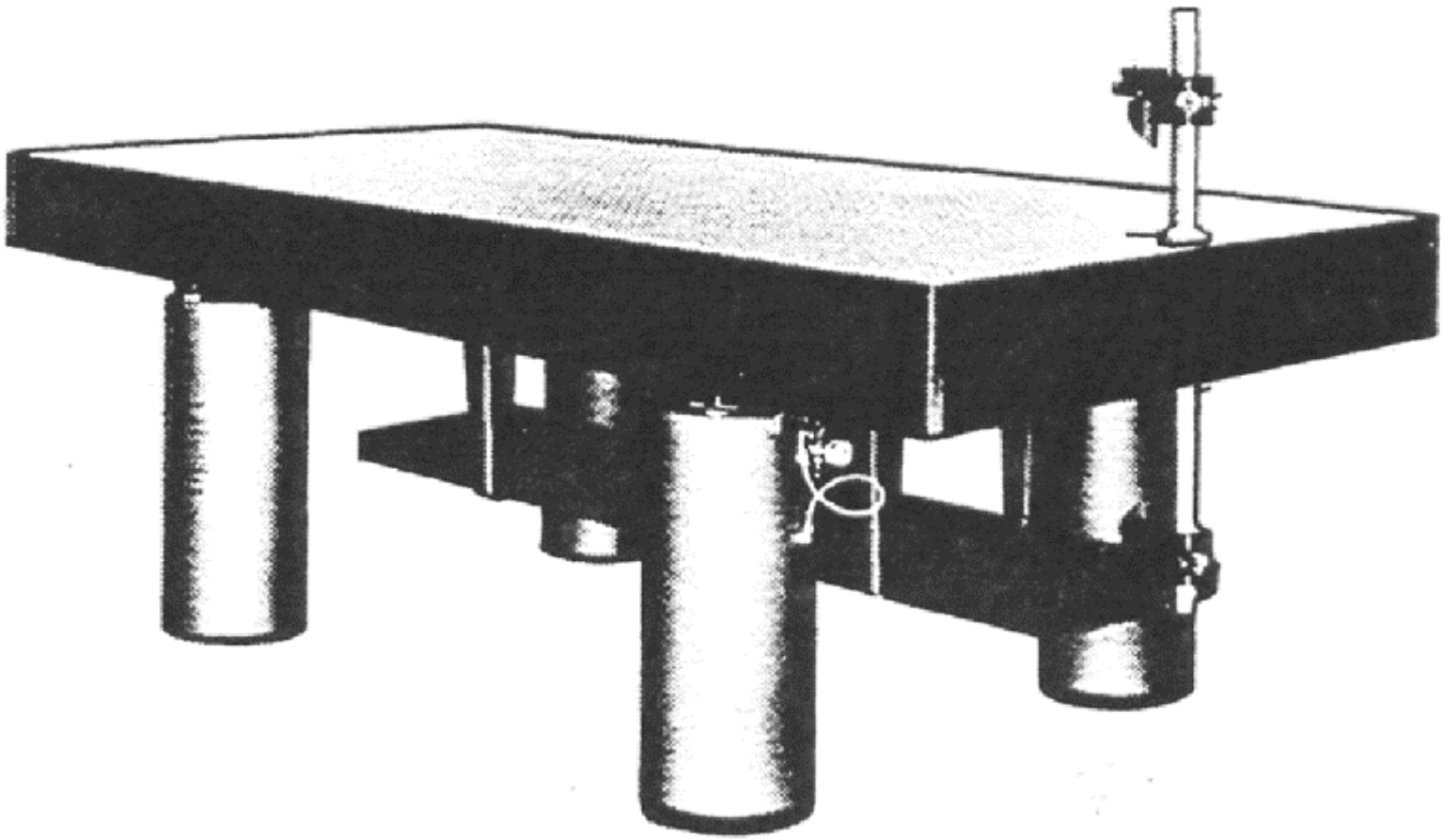


Figure 2-22 *Isolation table with pneumatic legs*

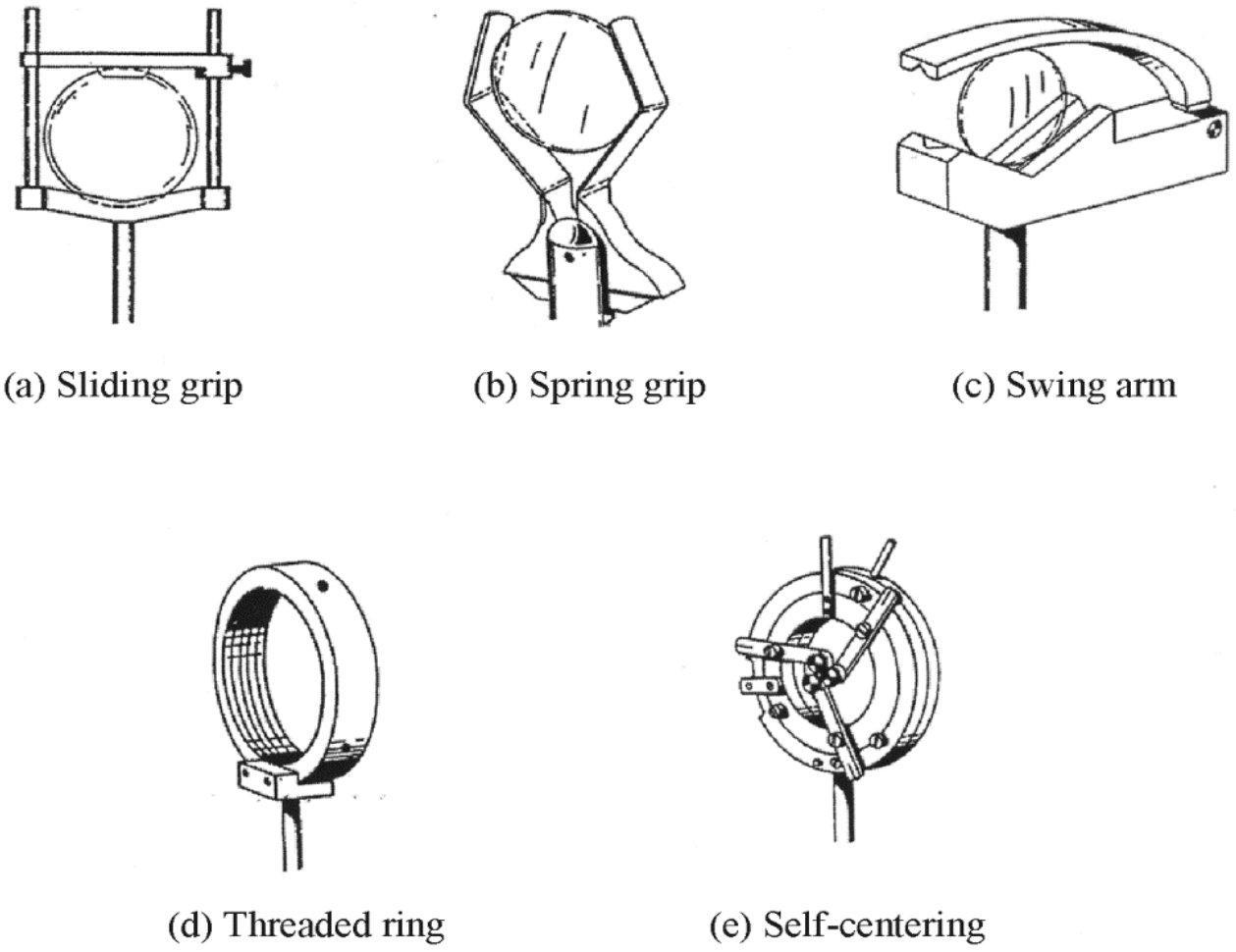
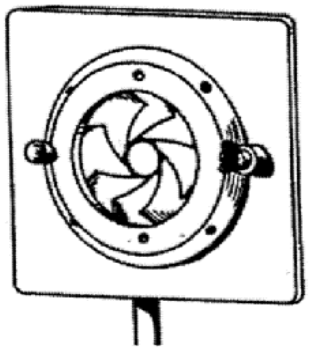
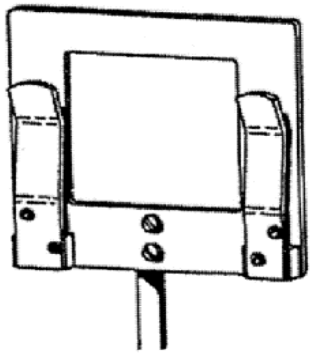


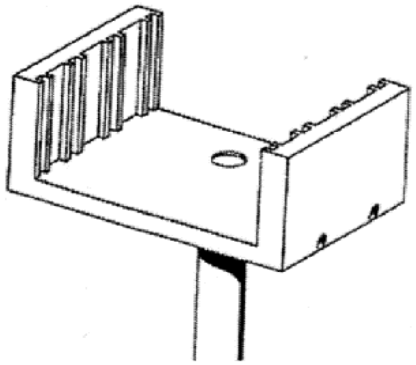
Figure 2-23 *Different types of lens/mirror mounts*



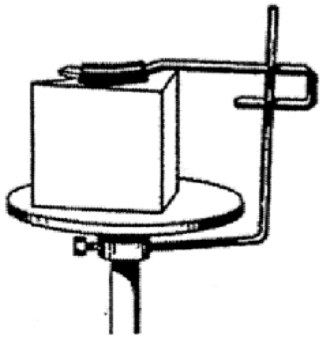
(a) Iris diaphragm



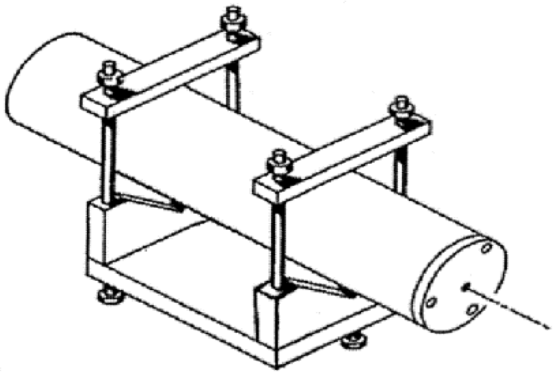
(b) Filter holder



(c) Filter holder

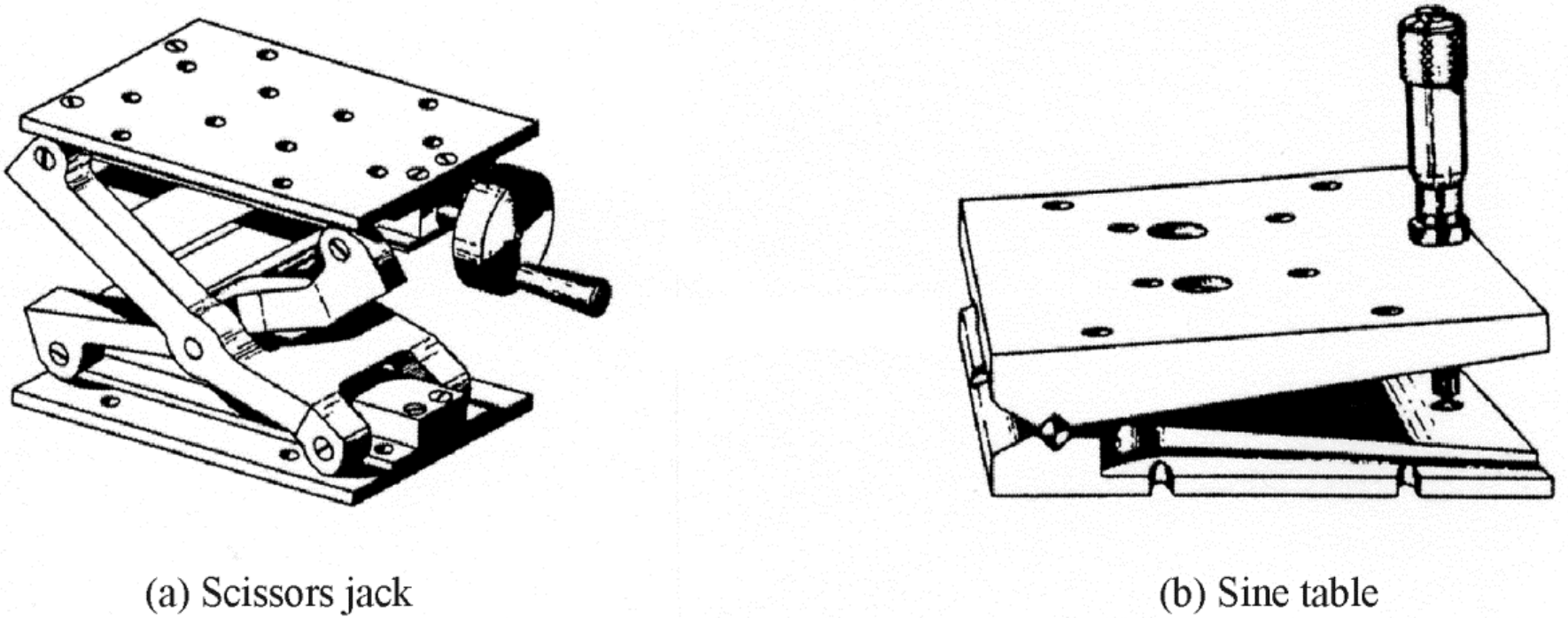


(d) Prism holder



(e) Laser holder

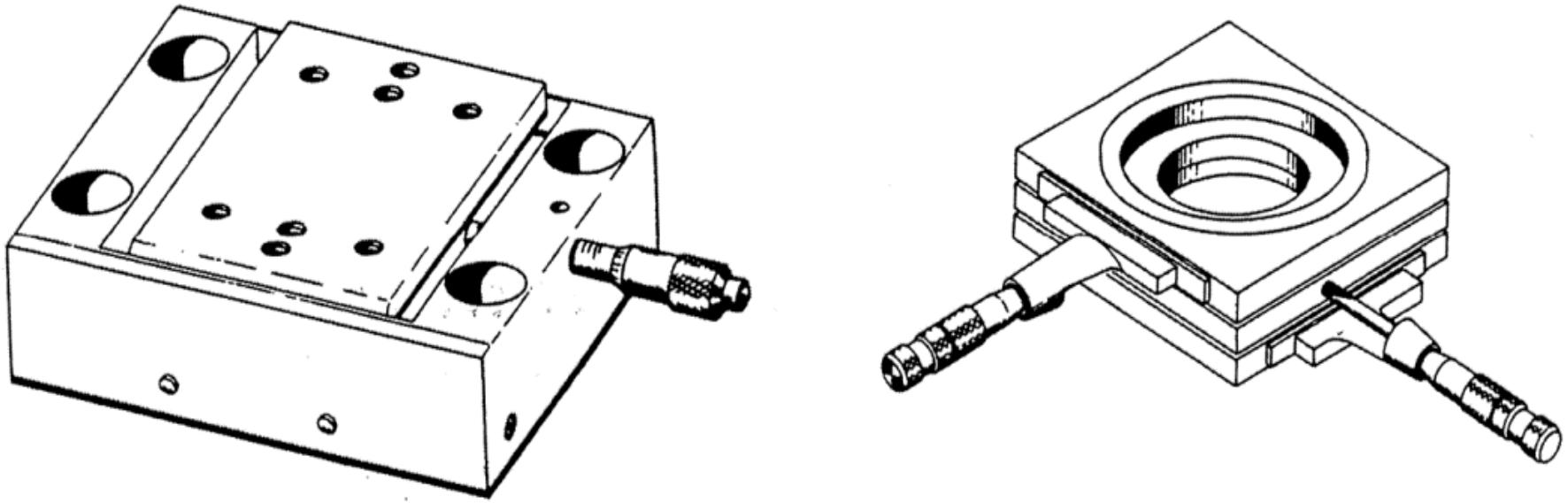
Figure 2-24 *Other types of holders for optical elements*



(a) Scissors jack

(b) Sine table

Figure 2-25 *Schematic diagram of a scissors jack and a "sine table"*



(a) Linear translator

(b) Two-dimensional translator

Figure 2-26 *Schematic diagrams of one-dimensional and two-dimensional translators*

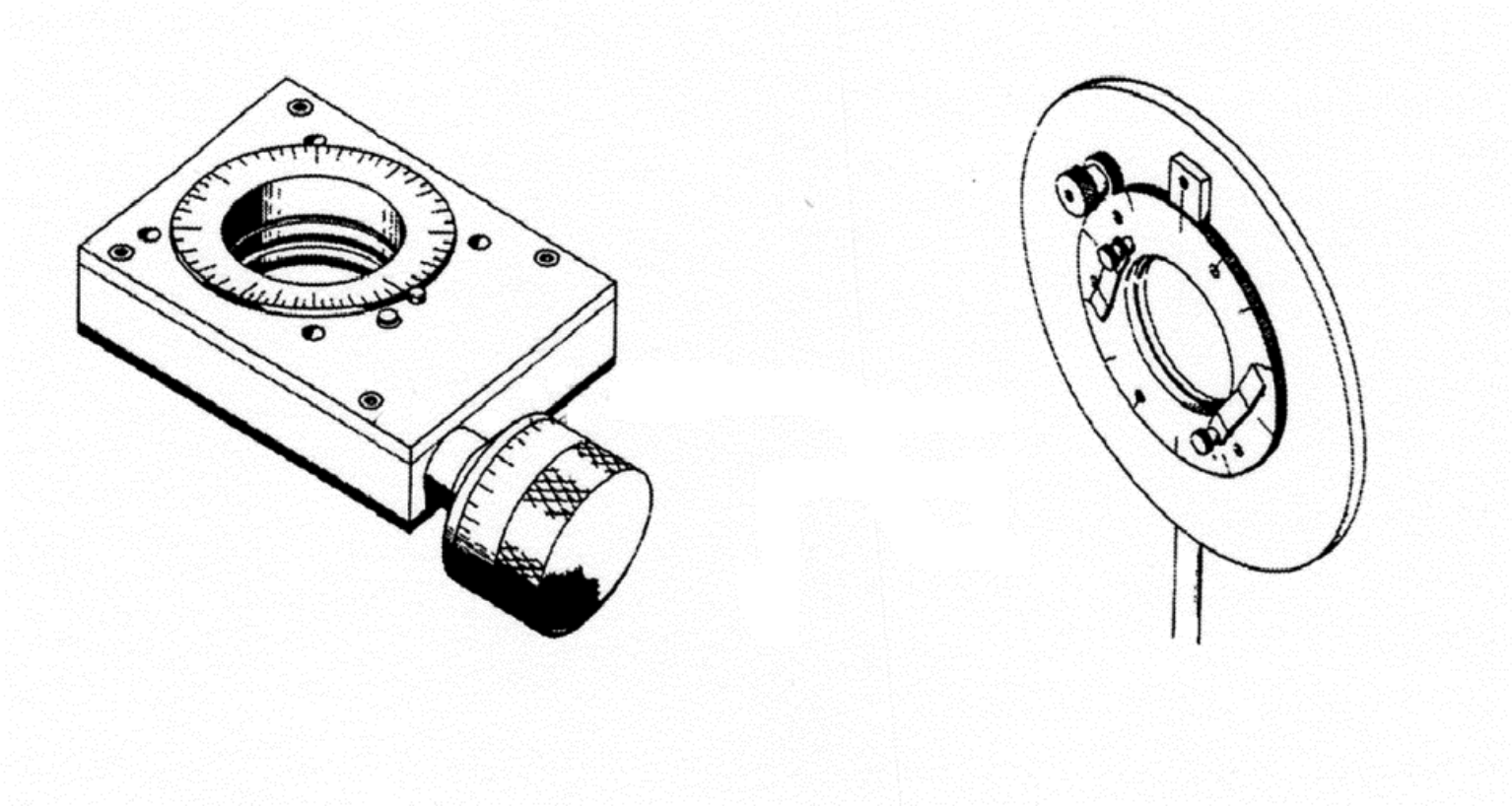


Figure 2-27 *Picture of a simple rotational stage and a rotational stage of designed to hold Polaroid sheets*

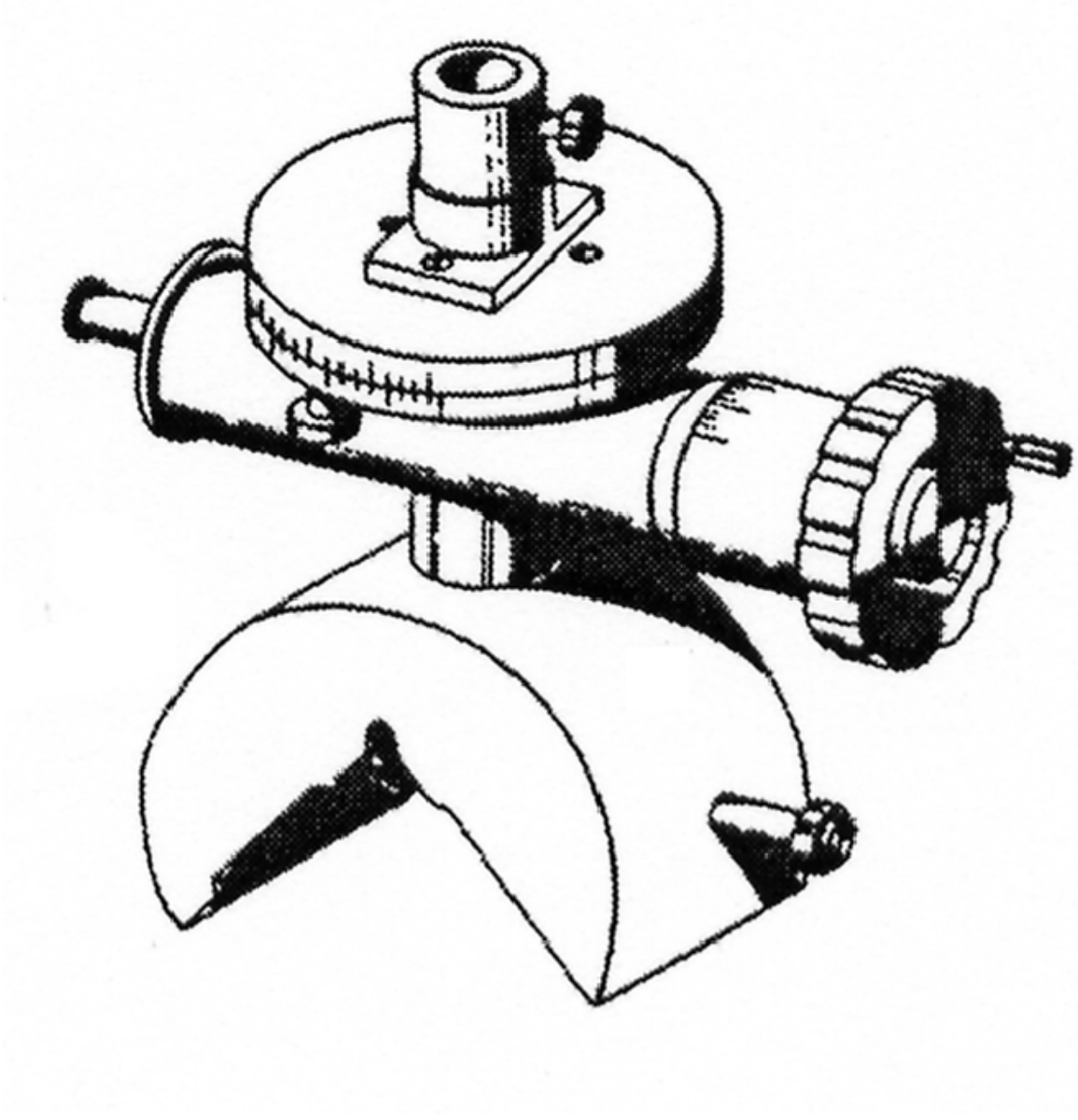
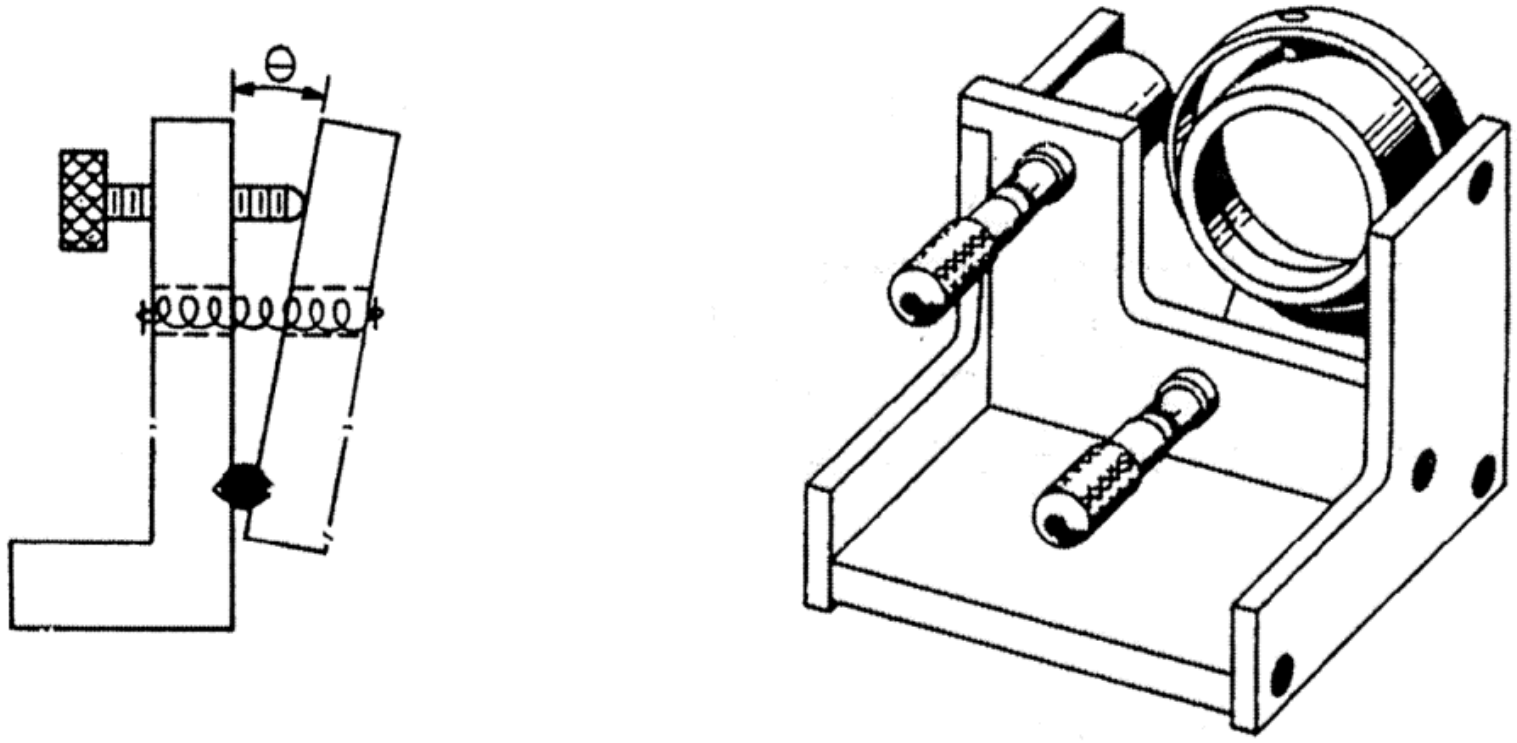


Figure 2-28 *Combined rotational and translational stage*



(a) Single-slit tilt

(b) Double-angle tilt

Figure 2-29 *One and two-dimensional tilting stages*

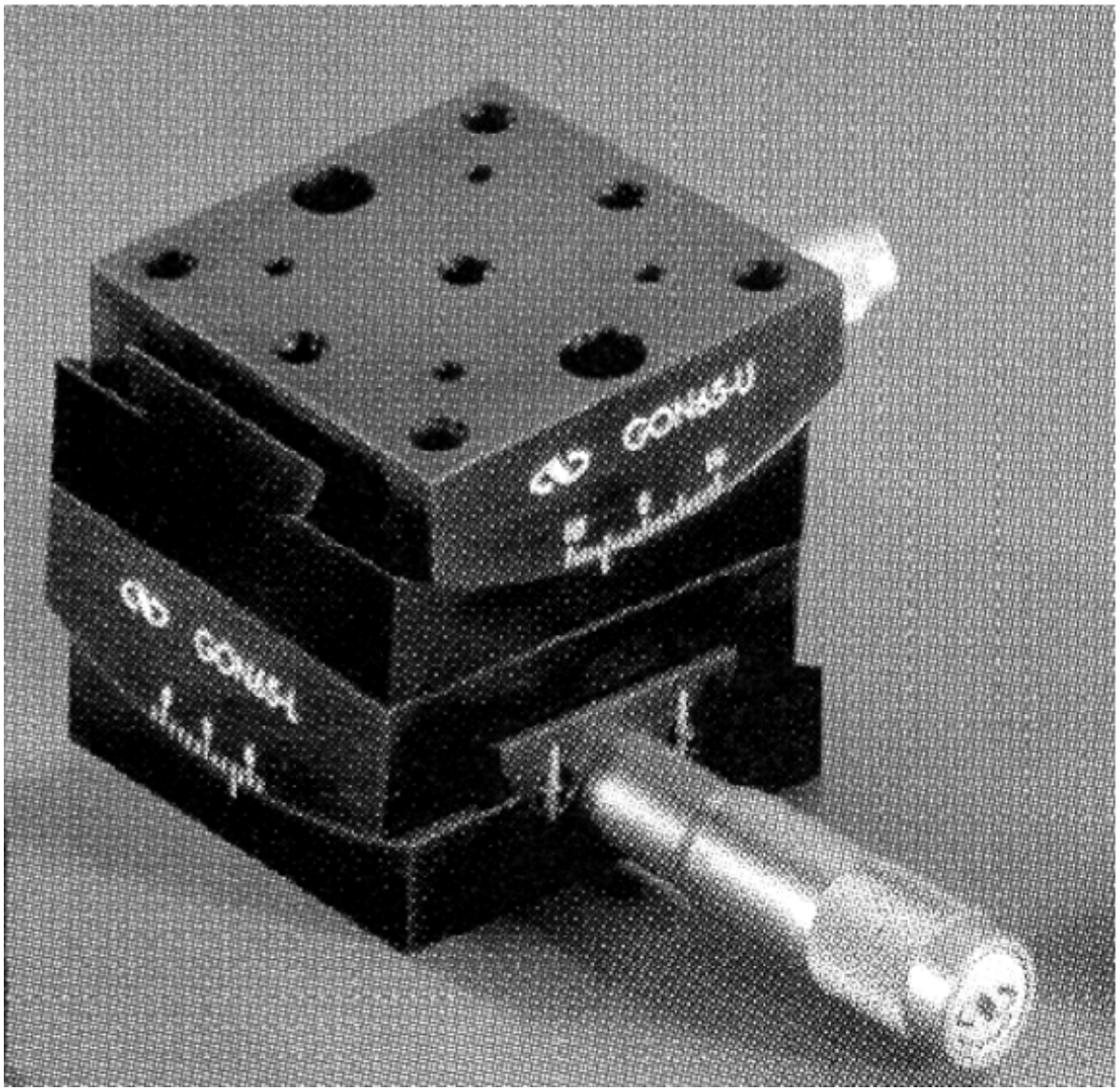


Figure 2-30 *A commercial goniometer*
(Courtesy: Newport Corporation)

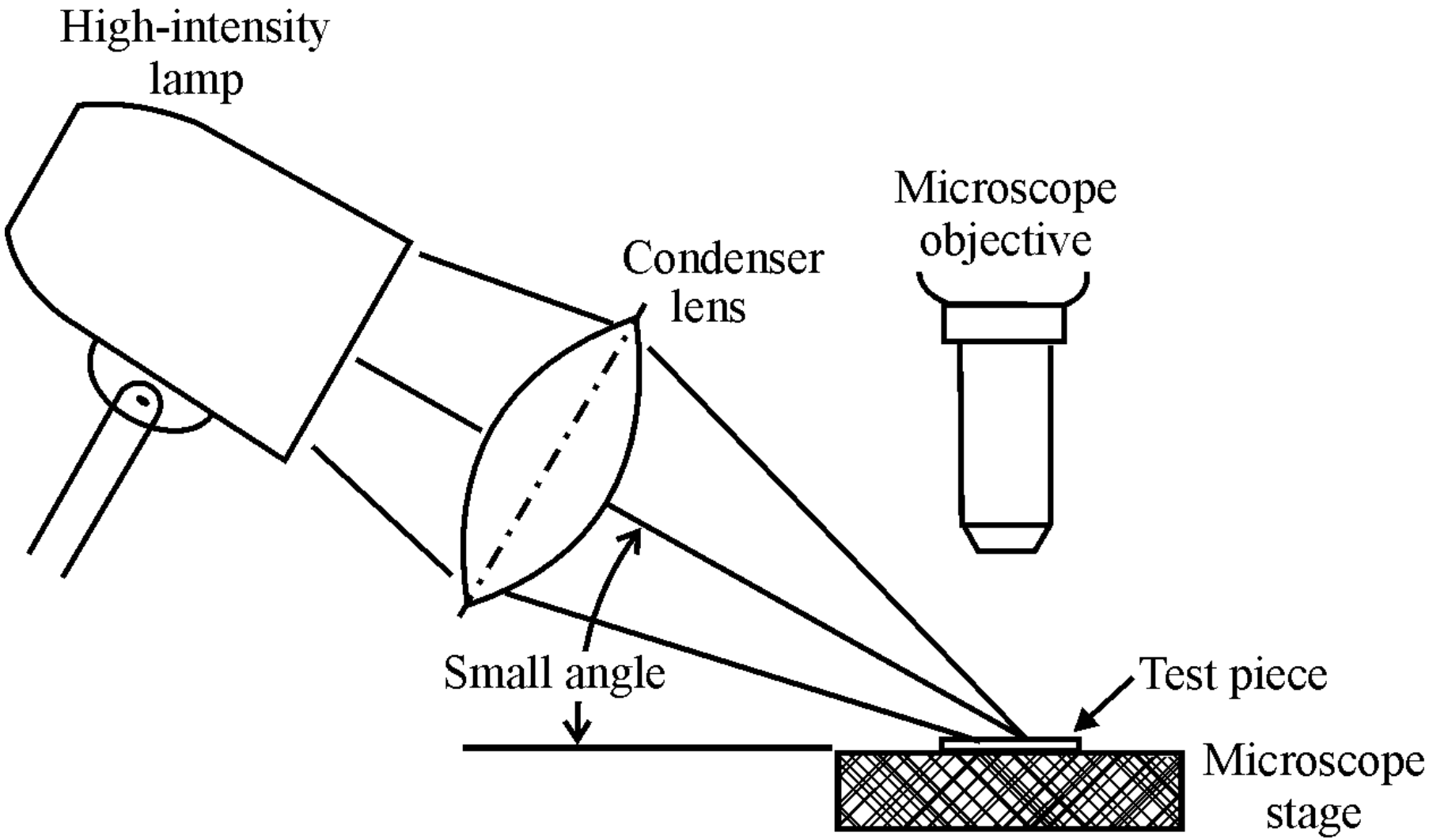


Figure 2-31 *Schematic diagram for observing surface imperfections on an optical element*

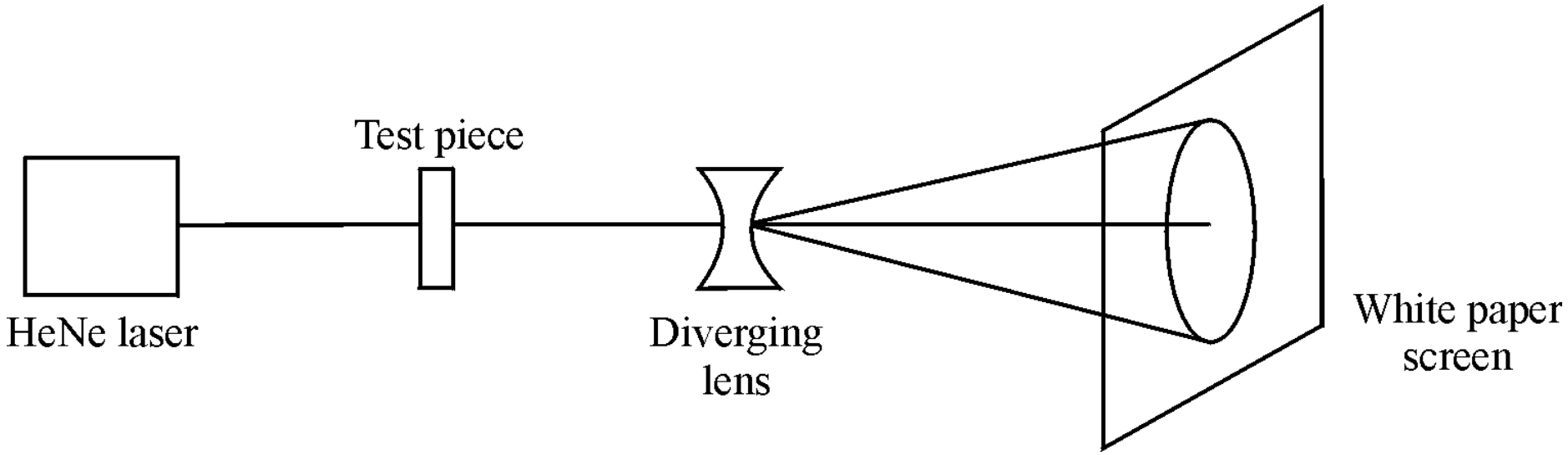


Figure 2-32 *Schematic diagram of an optical setup used to observe internal defects in an optical element*

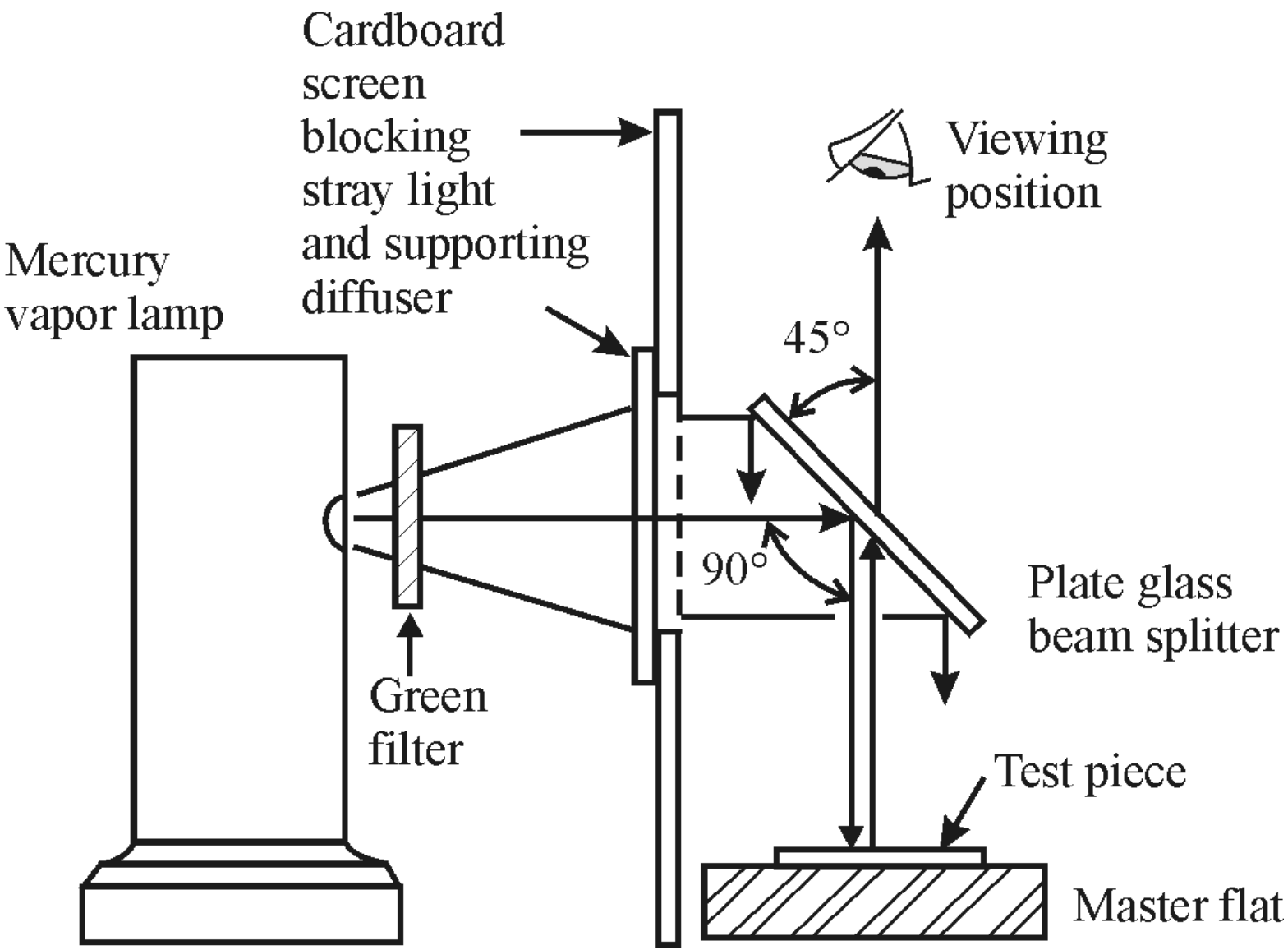


Figure 2-33 *Experimental setup designed to observe interference fringes on a flat optical element*

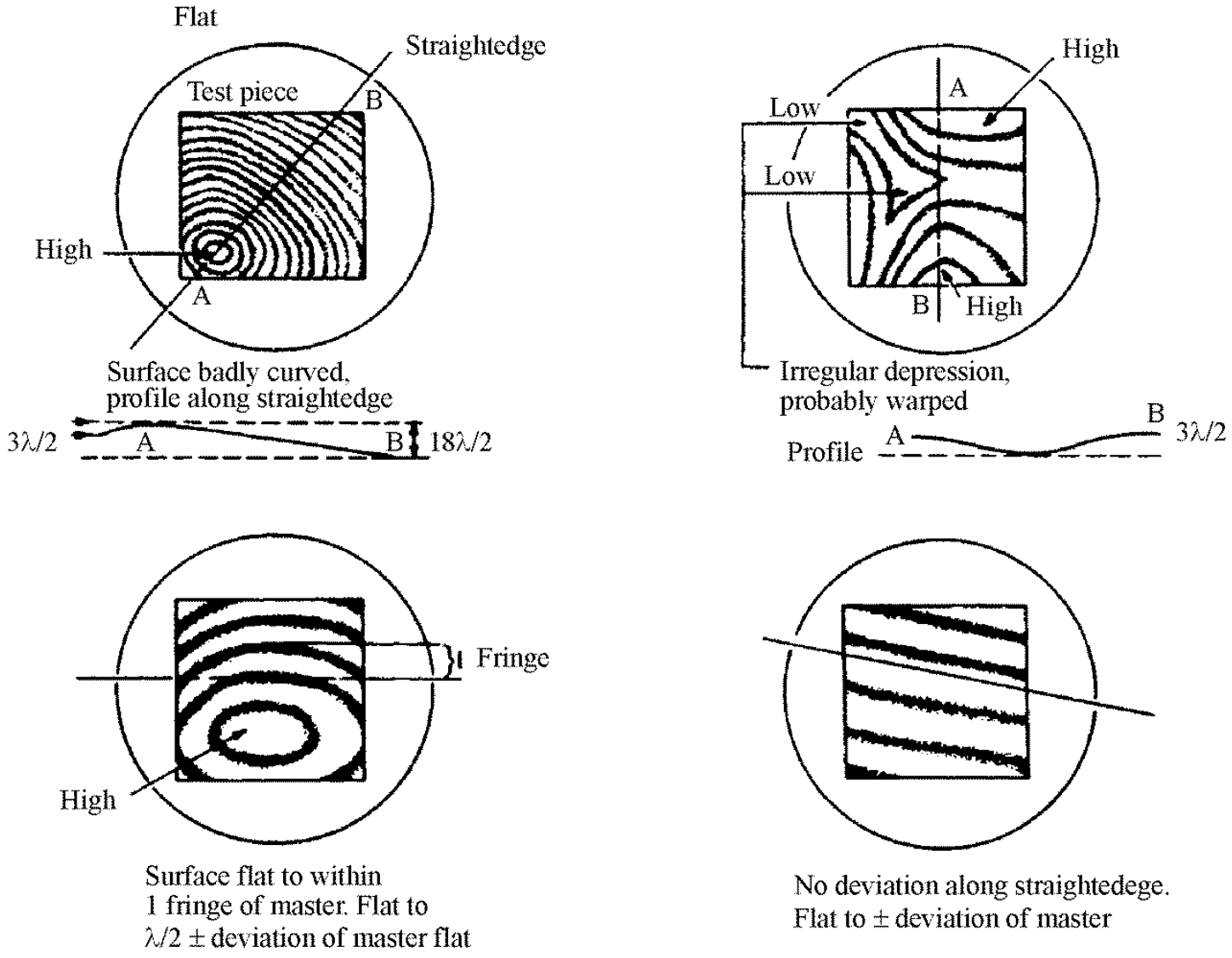


Figure 2-34 *Typical interference patterns observed on flat optical test plates of different flatness*