

## Applications for IR Light, Lasers and LEDs

**MEDICAL** - Photocoagulation, blood cell analysis, surgery (plastic, general, ENT, arthroscopic) cancer treatment & detection, dermatology, gastroenterology, angioplasty, ophthalmology, dentistry, otorhinolaryngology, urology, lithotripsy (kidneys & gallstones), cataract removal, retinal studies, tissue ablation, orthopedics, detection of DVT & venous disorders, non-invasive blood oxygen measurements, fluorescence, corneal research, augmentative hearing devices, neurological research (circadian rhythms), general biological research.

**INDUSTRIAL** - Culling, welding, annealing, marking, drilling, robotics, machine vision, automation, microelectronic soldering, resistor trimming, inspection, alignment, material handling, sorting, counting, distance sensing, surface analysis, speedometers

**COMMUNICATIONS/DATA** - Fiber optic installation & maintenance, LIDAR, security systems, data transmission & translation, optical storage disks (CD), facsimiles, laser printers, laser scanners, image processing, bar-code scanners, high speed cameras, optical waveguides, CATV, rangefinders, guidance systems, weapons simulation, targeting systems, velocimetry, auto focusing, motion sensors.

**RESEARCH/ANALYSIS** - Spectroscopy (FTIR, raman, mass, vibrational, protein, molecular, time-resolved), particle velocimetry, IR microscopy, chemical analysis, oxygen content sensors, acousto-optic modulators, atmospheric analysis, material analysis (silicon), rain gauge, photon counting, flow cytometry, DMA sequencing, wind shear detection, moisture analysis (food, structural, NOT) ;

**IR VIEWING** - Film processing, darkroom training, art restoration, document examination, thermal viewing (glass furnaces), darkroom vision, forensics, fingerprint detection, surveillance, IR photography.

## Top 10 Reasons for Using Infrared

1. Most efficient transmission through fibers (1.3, 1.55 nm), used in many applications.
2. Easily frequency doubled to visible for data storage, printing etc.
3. Lower power/safer for welding & laser surgery.
4. Absorbed by water and/or tissue for medical applications.
5. Most semiconductors and inexpensive stable lasers, (Nd:YAG), are currently NIR.
6. Good pump source to excite visible and high power UV lasers (see 5).
7. Easier to use/align than CO<sub>2</sub> because of image conversion techniques.
8. Luminescent properties of inks and dyes in infrared under visible/UV light.
9. No detection by pupil for retinal observation and studies.
10. "Invisible" quality preferred for range finders, remote controls and covert operations.