Optoelectronics and Semiconductor Group

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Research areas: Optical networks, biophotonics, intelligent building networks, distance learning

Key words: FTTP, photonic component applications, biophotonics, biosensors, network reliability, network maintenance

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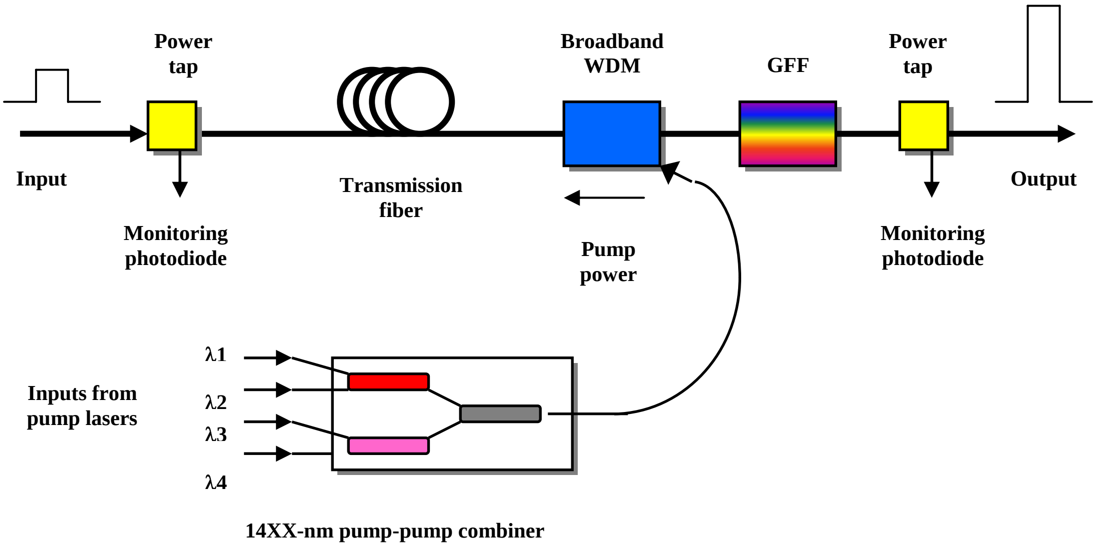
1. The Subject and Aims of Research

The research aims are on the applications of advanced photonic technology developments to new and existing technology fields. The focus is on investigating how passive optical components, advanced active photonic devices, optical sensors, and light-manipulation processes can be applied to areas such as telecom networks, integrated tenant services for intelligent buildings, indoor radio-over-fiber networks, highly efficient multimedia communications networks for healthcare services, and biophotonics processes and instruments for life sciences, healthcare, and the food industry.



2. Recent Research Topics

(a) Developed a new WDM PON classification scheme for evaluating and comparing the relative performances and costs of different WDM PON methodologies proposed for telecom access networks.

(b) Developing a highly reliable fail-safe WDM PON-based optical network and its associated communication and control system for use within an intelligent building. A network prototype will demonstrate how to reconfigure or isolate portions of the network in response to emergencies, such as fire, flooding, or building damage.

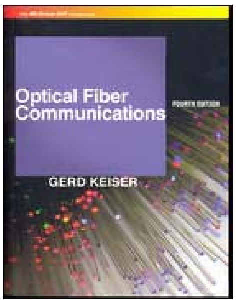
(c) Looking at the impact of critical environment effects and wildlife hazards on the reliability of photonic components and fiber cables for optical links used in intelligent buildings or intelligent campuses in Taiwan.

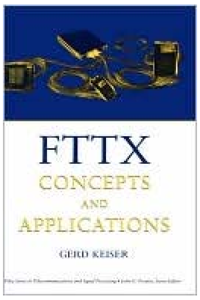
(d) Determining the wavelength-dependent characteristics of photonic components on medical imaging measurements, investigating bending loss effects through various types of short lengths of fibers used in healthcare instruments, and devising real-time optical sensors for monitoring the progress of biophotonic processes.

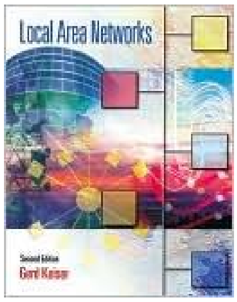
3. Selected Publications and Projects

Text Books

1. *Optical Fiber Communications*, McGraw-Hill, 4th ed., 2008.
2. *FTTX Concepts and Applications*, Wiley/IEEE Press, 2006.
3. *Optical Communications Essentials*, McGraw-Hill, 2003.
4. *Local Area Networks*, McGraw-Hill, 2nd ed., 2002.







Journal and Conference Papers

1. G. Keiser, Invited tutorial paper, “Wavelength Division Multiplexing (WDM),” *Optical Fiber Technology*, vol. 5, pp. 3-39, Jan. 1999.
2. J. Jiang, J.J. Pan, Y. H. Guo, and G. Keiser, "Model for Analyzing Manufacturing-Induced Internal Stresses in 50-GHz DWDM Multilayer Thin Film Filters and Evaluation of Their Effects on Optical Performances," *J. Lightwave Technology*, vol. 23, pp. 495-503, Feb. 2005.
3. G. Keiser and F.-J. Kao, “Biophotonic applications of optical communication devices,” *SPIE Photonics Europe 2008*, Strasbourg, France, April 2008.
4. C.-L. Tseng, C.-K. Liu, J.-J. Jou, W.-Y. Lin, C.-W. Shih, S.-C. Lin, S.-L. Lee, and G. Keiser, “Bidirectional Transmission Using Tunable Fiber Lasers and Injection-Locked Fabry-Perot Laser Diodes for WDM Access Networks,” *IEEE Photonics Technology Letters*, vol. 20, pp. 794-796, 15 May 2008.
5. G. Keiser, “Optical fibers for laser medicine: A review,” *The World Association of Laser Therapy 2008 Conference*, Johannesburg, South Africa, October 2008.