INFRARED SOURCES FOR SPECTROSCOPY BASED ON DIFFERENCE FREQUENCY GENERATION

F. K. TITTEL, R. F. CURL, K. PETROV, W. C. ECKHOFF, S. WANG, *Departments of Chemistry and Electrical and Computer Engineering and Rice Quantum Institute, Rice University, Houston, TX 77251*; R. S. PUTNAM, *Aerodyne Research Inc., 45 Manning Road, Billerica MA 01821*; L. HOLLBERG, S. WALTMAN, *Time and Frequency Division, National Institute of Standards and Technology, 325 Broadway, Boulder, Colorado 80303*; L. GOLDBERG, AND W. K. BURNS, *Naval Research Laboratory, Washington, D.C. 20375-5672.*

Rapid advances are being made in infrared sources based on difference frequency generation (DFG) through the introduction of new nonlinear materials, build-up cavity enhancement, and new diode-based pump and signal sources. These infrared sources have obvious application to high resolution molecular spectroscopy. In addition, the combination of all these elements promises a wide variety of compact, rugged, portable IR sources for applications such as environmental monitoring. Recent results obtained for difference frequency mixing in $AgGaS_2$, periodically poled $LiNbO_3$, and GaSe using diode, Nd:YAG, and Ti:sapphire pump sources will be reported. The suitability of the sources based on diode and Nd:YAG pumps for atmospheric monitoring has been demonstrated by the detection of ambient methane and CO.