

*For presentation at the 20th Winter Colloquium on Quantum Electronics, Snowbird, Utah,
January 2-5, 1990*

Advanced Concepts for Electron Beam Pumped Excimer Lasers

F.K. Tittel, W.L. Wilson, Jr., R. Sauerbrey, B. Dane, and S. Yamaguchi

Department of Electrical and Computer Engineering

Rice University

Houston, TX 77251-1892

The development of high intensity laser sources in the UV-visible range and, in particular, the development of a scalable ultrafast high brightness source will have a significant impact in a number of key technologies. These include applications in remote sensing and laser-matter interaction studies directed to the generation of laser produced plasmas which can be used to pump ultrashort wavelength lasers and generate soft x-rays in the 1 keV range for advanced photolithographic applications. Recent experiments of scaling the e-beam pumped $XeF(C \rightarrow A)$ laser to the Joule output level will be described. Prospects for the development of new high power hybrid solid state gas laser amplifiers for ultrashort pulses will be discussed. Of particular interest is the $XeF(C \rightarrow A)$ excimer transition which, due to its near 100 nm bandwidth and low gain cross section may be capable of directly amplifying pulses of less than 10 fs duration and operate at a saturation energy density which is an order of magnitude higher than other excimer amplifiers. In addition, intense short pulse excitation of diatomic and triatomic excimers can lead to new efficient injection controlled laser systems.