

**Nonlinear Control Strategies Inc. was announced the winner of a Phase I STTR award from the U.S Air Force Office of Scientific Research to develop a commercial closed-loop software environment to aid in fast tracking from semiconductor laser device concept through to materials growth and device optimization. A summary of the STTR goals is stated below:**

Semiconductor amplifiers and lasers are pervasive as critical components in modern day military and commercial technologies. High quality semiconductor wafer growth can now produce heterostructures of very high quality with stoichiometrically correct growth of individual mono-layers. Despite these significant advances in MBE and MOCVD growth technologies, a critical void remains in predicting the performance of final packaged functional amplifier or laser devices. The lack of predictive semiconductor device design and growth monitoring capability can be traced to the extreme complexity of calculating the semiconductor optical response from first principles. Parallel progress in basic research over the past decade has led to the emergence of the first fully predictive theory of the optical properties of semiconductor heterostructures. A Nonlinear Control Strategies /University of Arizona collaborative project proposes to develop robust commercial PC-based software tools built on such microscopically computed optical gain databases. Individual modules will aid in semiconductor epi design, growth monitoring and overall functional device optimization. Such closed-loop software tools applicable to a broad class of material systems, will enable the laser designer and materials grower to fast track from device design concept through growth to the final packaged device, thereby avoiding costly and wasteful material re-growth and packaging cycles.