## FORTHCOMING PAPERS

**Sum-Frequency Generation by Oppositely Travelling Surface Plasmon Waves**

*Z. Chen, Y.-j. Liu, J.-b. Zheng, W.-c. Wang, Z.-m. Zhang (P. R. China)*

We report the first experimental study on the enhancement of sum-frequency generation in a metal by counter-propagating surface plasmon waves in the Kretschmann's ATR (attenuated total reflection) configuration. The experimental results are coincidence with the theoretical calculation.

**Numerical Analysis of Multi-Mode Laser with Modulated Inversion**

*T. Ogawa, E. Hanamura (Japan)*

A systematic description is developed for the dynamical behavior of a multimode unidirectional ring laser under modulation of the population inversion in a homogeneously broadened active medium. The modulation frequency is chosen to be close to the longitudinal mode spacing in the cavity. We report a rigorous and extensive numerical analysis of this system by choosing the dc component of the population inversion, the modulation amplitude and the detuning of the modulation frequency as control parameters for both cases of good and bad cavities. In the good cavity, this system exhibits two characteristic transitions toward the conventional mode-locked pulse oscillation as the modulation amplitude increases: the first transition to the region of the ordered amplitude and disordered phase of the electric field, and the second one to the ordinary mode-locking in wich both the amplitude and the phase are ordered. In the bad cavity, two kinds of chaos are observed: the Lorenz-type chaos in the region of weak modulation and strong population inversion and the quasi-periodic chaos in the region of strong modulation and intermediate population inversion. The dimensionality of chaotic behaviors is also tested to reveal mechanisms of instability. The coherent and incoherent properties of emitted light at each region are clarified, too.

**Sensitive Detection of $H_2$ Molecules by Two-Photon Excited Laser-Induced-Fluorescence**

*Y. Okada, M. Maeda, Y. Kajiki, K. Muraoka, M. Akazaki (Japan)*

The sensitive detection of $H_2$ molecules was demonstrated by means of two-photon excited laser-induced-fluorescence spectroscopy with a narrow-band ArF excimer laser. A detection limit of $2\times10^{14}$ cm$^{-3}$ was obtained with an excitation power of ~150 kW. This is already comparable with that obtained by the coherent anti-Stokes Raman scattering (CARS). This technique was successfully applied to measure a spatial distribution of $H_2$ in a town-gas burner.

**Calculation of Geometrical Changes in Cylindrical Copper Hollow Cathodes due to Sputtering**

*J. Hamisch (F.R. Germany)*

To find the reasons for the distortion of a cylindrical hollow cathode into a row of hollow spheres, the system of diffusion equations for the three most important types of particles in the hollow cathode discharge is solved, taking into consideration the essential source terms. In qualitative agreement with the experiments, the results show inhomogeneities of the cathode erosion at the cathode edges and at the boundary between hollow cathode discharge and normal glow discharge areas.

**Light Absorption in Laser-Heated Cavities**

*I. B. Földes, R. Pakula, S. Sakabe, R. Sigel (F.R. Germany)*

The absorption of laser light in 0.25-1 mm diameter gold cavities, irradiated for the purpose of generating high-temperature blackbody radiation with intense laser radiation of either $\lambda = 0.44$ μm or $\lambda = 1.3$ μm wavelength, was investigated. For $\lambda = 0.44$ μm radiation the absorption exceeded 0.9 for all conditions, but dropped to only 0.3 for the smallest cavities irradiated at $\lambda = 1.3$ μm. Entrance hole and cavity filling with plasma seems important for the understanding of the observations.