Principal Researcher	Totaro Imasaka	**Number of Researchers**	3
Research Institution・Department・Title	Professor, Graduate School of Engineering, Department of Applied Chemistry, Kyushu University	**Location of Institution**	Fukuoka

Title of Project	Generation of Multi-color Laser Emission and Ultrashort Optical Pulses and Their Applications to Advanced Modern Technology
Abstract of Research Project	Many vibrational and rotational Raman lines are simultaneously generated in a wide frequency regime from the deep ultraviolet to the infrared by stimulated Raman scattering and subsequent four-wave Raman mixing using hydrogen. It has already been shown that these emission lines are phase-locked and generate, in theory, ultimately-short optical pulses. In this work, the following research subjects are studied for the generation of the multi-color laser emission and ultrashort optical pulses and their applications to advanced modern technology. (1) Generation of a highly-repetitive optical pulses A monochromatic continuous-wave Ti: sapphire laser, whose emission wavelength is adjusted to a specified value, is focused into the resonator with high reflectivities, in which hydrogen is contained. This approach promises the generation of high-repetitive (17 THz) ultrashort optical pulses. (2) Generation of a high-power ultrashort optical pulse A femtosecond laser is focused into a Raman cell containing hydrogen for the generation of an ultrashort laser pulse whose pulse duration is ten times shorter than the conventional femtosecond laser. In this case, it is required to sufficiently suppress other nonlinear optical effects. (3)Development of applications for multi-color ultrashort laser The application of highly-repetitive pulses to optical communication and of high-power multi-color laser emission to laser display are studied for practical use in modern society. Time-resolved crystallography will be one of the candidates for basic studies which might be accomplished by a high-power ultrashort laser pulse.
References	"Generation of Highly-Repetitive Optical Pulses Based on Intra Cavity Four-Wave Raman Mixing", K. Shinzen, Y. Hirakawa, T. Imasaka, Phys. Rev. Lett., 87(22), 3901 (2001).
Term of Project	Fiscal years 2001-2005 (5years)

Budget Allocation (in thousand of yen)	FY2001	FY2002	FY2003	FY2004	FY2005	TOTAL
	28,600	19,700	26,900	11,400	8,600	95,200

Homepage Address	http://imasaka10.cstm.kyushu-u.ac.jp/