

Principal Researcher	Makoto Gonokami			Number of Researchers	5	
Research Institution • Department • Title	Professor, Graduate School of Engineering, University of Tokyo			Location of Institution	Bunkyo-ku, Tokyo	
Title of Project	Development of New Functionality in Spin-Charge-Photon Coupled Systems					
Abstract of Research Project	<p>This project is an extension of a COE research program entitled "Phase Control of Spin-Charge-Photon Coupled Systems", which was funded from FY1996 through FY2002. In this project, the novel phenomena discovered in the strongly correlated electron systems (SCES) during the COE program will be integrated into functional materials and devices. Exchange interaction, electron correlation, and charge transfer all compete in SECS with the energy scale as large as many electron volts resulting in delicate and drastic phase balance. We took the advantage of the large energy scale of photons to modify and control the phase balance; strong magneto-optic response, nonlinear optical effects, and photoinduced phase transitions are among the novel phenomena found for the first time in the COE program. In this project, we will explore the way that leads to the engineering of the next generation. Close collaboration will be continued to make full use of our expertise; materials design and detailed measurements, laser spectroscopy, and theoretical studies. The topics to be investigated include, (1) photoinduced phase control and electronics based on the electron correlation (Miyano), (2) materials design for new functionality in SCES (Tokura), (3) exploration of electron correlation phenomena in molecular matter (Kanoda), (4) establishment of a guiding principle for the functionality design using the quantum field theory (Nagaosa), and (5) SECS opto-electronics (Kuwata-Gonokami).</p>					
References	<p>T. Ogasawara et. al., Ultrafast optical nonlinearity in the quasi-one-dimensional mott insulator Sr_2CuO_3, Phys. Rev. Lett., Vol. 85, 2204-2207 (2000).</p> <p>T. Kise et. al., Ultrafast spin dynamics and critical behavior in half-metallic ferromagnet : $\text{Sr}_2\text{FeMoO}_6$, Phys. Rev. Lett., Vol. 85, 1986-1989 (2000).</p>					
Term of Project	Fiscal years 2003-2007 . (5years)					
Budget Allocation (in thousand of yen)	FY2003	FY2004	FY2005	FY2006	FY2007	TOTAL
	16,600	15,600	15,600	15,600	15,600	79,000
Homepage Address	http://www.qpec.t.u-tokyo.ac.jp					