Division of I	Electrical Engineering and	Research	Fundamentals and Applications of Plasmas	Lab. ID	
Co	omputer Science	field		EC20	
Deserve avkisets					
Research subjects					
We have studied fundamentals and applications of different types of plasmas: from high-density high heat flux plasmas to low-density low power density plasmas for their next generation applications. The research subjects					
are described as follows:					
1. High-dens	ts of different types of ind	na for advand	led thermal plasmas and their applications to mate	i on new	
reassant their applications to materials					
synthesis A	synthesis Arc/ thermal plasma quenching properties are also subjects using polymer ablation/spallation for circuit				
breakers. A multi-phase plasma is one keyword for innovative advanced applications with solid liquid gas and					
plasma phases.					
2. High-pressure non-equilibrium plasma application to industrical innovation In this field, we are interested					
in developing novel applications three kinds of plasma sources such as a novel high-density non-equilibrium					
plasmas by microwave excitation using liquid as source gas, a dielectric barrier discharge using rotary electrodes,					
and a plasma jet type using a low frequency and microwave power sources. These can be applicable for materials					
processing suitable at low-temperature environment and also will provide innovation for nano, bio, and medical					
applications as well as semiconductor fabrication process.					
3. Low-pressure arc plasma The vacuum arc plasma is receiving great attention in the switching arcs, and					
vacuum deposition etc. We are developing a new technique to simulate the behavior of vacuum arc by the particle					
and current	and voltage control for an	s by semicor	aductor switching	secroscopy	
	and voltage control for art	is by serificor	nuuctor switching.		
Master/Doc	tor course: Education polic	cy, curriculu n	n, typical activity in the laboratory		
Experiemnta	l and numerical appoarche	s in high-der	nsity plasmas and low-pressure non-equilibium plas	sma	
technologies	s in our laboratory offer yo	u big opportu	inities to learn electrical/electronic circuits, contro	ol theories,	
electromagn	etic field, fluid dynamics, c	hemical reac	tions, atomic and molecular theories, thermodynan	nics,	
spectroscop	ic theories, as well as plas	ma physics a	ind technologies. Programming can be done to simi	Jlate	
hydrodynam	ics of plasmas and also for	r signal proce	essings.		
Deily life in the leberatory, etc.					
Students in	our laboratory, etc.	vnerimental	nd numerical simulation approaches to plasma tec	hnologies	
from designs	our laboratory can learn e	rement syst	ame programming for plasma fluid dynamics. We be	ave a meeting	
about our re	asearch progresses to dis	cuss solution	s for the next step. In addition, we have a weekly i	nteractive	
lecture to le	arn fundamentals of plasm	a physics to	enhance the abilities of all colleagues and students	s. Introduction	
of recent journal paper about plasma technologies by each of members provides recent knowledgements to					
everyone in	our laboratory. We welcom	ne to have co	Ilaboration works with some companies to know in	dustrial needs	
to be solved.					
Message or comments by the laboratory faculty staffs					
We have cordially been welcoming for members who would like to study and progress our subjects about plasma					
physics and plasma application together with us.					
Recent Mas	ter theses in these 3 years	s (+ more if a	ppropriate)		
year.month	Thesis title (including Eng	lish translatio	on of Japanese thesis title)		
2021.3	Quenching Gas Injection	Technique fo	r Si/C Nanopowder Synthesis using Modulated Ind	uction	
2021.0	Thermal Plasmas with Sy	nchronous Fe	eeding of Feedstock		
2021.3	Three-Dimensional Two-	Temperature	Modeling of Ar Loop-Type Inductively Coupled Th	ermal Plasma	
2021.0	and Si Surface Modification	on			
2021.3	Composition Analysis of F	-unctional	Nano- Materials using Laser-Induced Breakdown S	Spectroscopy	
2021.3	Study on Hydrophillic Tre	atment of Po	lymer Microparticle Material using Dielectric Barrie	er Discharge	
2021.3	with Rotatable Electrodes				
2021.2	Development of Microway	e Excited Pla	asma Enhanced Chemical Vapor Deposition Metho	d for Yttrium	
2021.3	Oxide Film Formation				
2001.0	Evaluation and Developm	ent of Nitroge	en Species Produced in Liquid using Handy-type A	tmospheric	
2021.3	Pressure Plasma Jet for	Wound Healir	lg		
	Study on High-Speed Pol	ycrystalline [Diamond Film Deposition using Modulated and Non-	-Modulated	
2021.3	Ar/CH4/H2 Induction The	ermal Plasma	S		

2021.3	Development of a Numerical Model for Compressible Thermofluid Flow inside/outside the Plasma Arc Cutting Torch and Estimation of Cathode Erosion			
2021.3	Development of a Numerical Model for Vacuum Arcs using MPS Method and Calculation of Vacuum Arc Behavior			
2021.3	Study on Reactive Oxygen Species Generation Process in Aqueous Solution Using Nonthermal Atmospheric Pressure Helium Plasma Jet Irradiation			
2020.3	Elucidation of molten steel flow behavior on the plasma arc cutting surface by laser strobe imaging			
2020.3	Development of Tandem Type of Induction Thermal Plasma with Tempo-spatial Varying High Temperature Reactive Field and its Application to Large Scale Synthesis of Nanoparticle			
2020.3	Study on Uniformity Improvement of Photoresist Removal Rate in a Wafer Surface using Microwave- excited Plasma			
2020.3	Numerical Thermofluid Simulation on High Current Air Arcs Contaminated with Metal Vapor from Evaporation of Metal Electrodes in Open Air and Fabric Temperature Rise for Arc Resistant Clothing			
2020.3	Analysis of Fundamental Electrical and Chemical Properties of 1 MHz Atmospheric Pressure Plasma Jet			
2020.3	Fundamental Experimental and Numerical Studies on Decaying Arc Plasmas in Different Gas Flows Considering Alternatives for SF ₆			
2019.3	Fabrication of Monocrystalline and Polycrystalline Diamond Films using Modulated and Non-Modulat Ar/CH4/H2 Induction Thermal Plasmas at Reduced Pressure			
2019.3	High Rate Production of Si/C Nanoparticles with Modulation of Feedstock, Power and Cooling Gas Injection			
2019.3	Metal impurity injection by laser blow-off and hydrogen retention in the co-deposited films			
2019.3	Visualization System of Molten Steel Behavior in Plasma Arc Cutting and its Application to Suppression of Dross Adhesion			
2019.3	Fundamental Study on Dielectric Recovery Process after CO2 and Air Arc Extinction and Cooling Technique of Hot Gas			
2019.3	Fundamental Study on Rapid Oxidation and Nitridation of Si/SiC Surface using Loop Type of Inductively Coupled Thermal Plasmas			
2019.3	Development of Dielectric Barrier Discharge using Rotational Electrodes and Analysis of Fundamental Electrical Properties			
2018.3	High-Rate Synthesis of Silicon Nanopowder/Nanowires using Modulated Thermal Plasmas with Intermittent Feeding of Feedstock			
2018.3	Development of ZnO film deposition methods using ZnO precursors with an aid of microwave excited atmospheric pressure plasma jet			
2018.3	Thermofluid Simulation by ANSYS Fluent in Plasma Arc Cutting Torch			
2018.3	Investigation of Photoresist Removal Process in Microwave Excited Plasma Using Water as Source			
2018.3	Investigation of frequency dependence of chemical species production in liquid by non-equilibrium atmospheric pressure plasma irradiation			
2018.3	Two-Dimensional Rapid Oxidation of Si/SiC Substrate Surface using Loop Type of Inductively Coupled Thermal Plasmas			
2018.3	Fundamental Application of Modulated and Non-Modulated Ar/CH ₄ /H ₂ Induction Thermal Plasmas to Diamond Nucleation and Film Growth			
2018.3	Shielding Effect of Ablative Fibers and Light Absorption Additives against Thermal/Radiative Fluxes from Arc Plasmas for Arc Resistant Fabrics			
2018.3	In-situ Surface Analysis of Plasma-Facing Walls using Laser-Induced Breakdown Spectroscopy			
2017.3	Development of high-efficient inactivation method for particulate food by non-equilibrium plasma			
Recent Doct	coral theses in these 3 years (+ more if appropriate)			
year.month	Thesis title (including English translation of Japanese thesis title)			
2021.9	Treatment			
2021.3	Arc quenching by ablation of superabsorbent polymer with H2O and its numerical thermofluid modeling			
2019.9	Study on the Memory Effect of Long-Lived Excited Species in Dielectric Barrier Discharge in He with N2 Admixture			
2018.9	STUDY OF ELECTRICAL AND DIELECTRIC PROPERTIES OF DIELECTRIC BARRIER DISCHARGES (DBD) GENERATED BY SILICON DIODE FOR ALTERNATING CURRENT (SIDAC) IN WATER			
2018.3	Fundamental study on quenching technique and decaying processes of arc plasmas using solid and gas media			
2018.3	Development of large-scale nanopowder synthesis method using modulated inductively coupled thermal plasma and visualization of reaction fields in the torch			