パルスパワー研究室

SDGs達成に向けた取り組み

研究テーマ・キーワード Research Themes・Keywords

極めて短い時間スケールで発生するパルスパワー技術とパルス放電プラズマの産業応用の研究

Research on industrial applications of pulse power technology and pulse discharge plasma generated on extremely short time scale

- パルスパワー Pulse power
- 放電プラズマ Discharge plasma
- 電源開発 Power supply development
- 環境浄化 Environmental purification
- 材料合成 Material synthesis

担当教員 Subject Teacher 喜屋武 毅 KIYAN Tsuyoshi

PROFILE

職 位 Position	教授・大学院教授 Professor・Professor at Graduate School	担当講義科目 Charge of Subjects	パワーエレクトロニクス、応用電子工学特論 Power Electronics, Advanced Applied Electronics
大学院 Graduate School	電子情報工学コース Electronics and Computer Science Course		
学 位 Degree	博士（理学）、博士（工学） Doctor of Science, Doctor of Engineering	e-mail	kiyan@fuk.kindai.ac.jp

FOR MORE

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研究概要 Research Outline

数百ナノ秒という極短時間で大電力を発生させるパルスパワー技術を用いて、放電プラズマを環境浄化や材料合成プロセスに応用するための基礎研究を行っています。

We are conducting fundamental research to apply discharge plasma by using pulse power technology, which generates high power in a extremely short time of several hundred nanoseconds, to environmental purification and material synthesis processes.

進行中の研究内容 Research Contents in Progress

1. 放電プラズマに伴う現象は様々な形態で産業応用が可能で、放電プラズマの生成や制御法が重要になる。微生物の殺菌、有機化合物の分解、農作物の改良、水質改善など環境にやさしい社会を実現する研究を進めています。

   The phenomena associated with discharge plasma can be applied to industry in various forms, and the generation and control of the discharge plasma become important. We have research to realize an environment-friendly society such as sterilization of microbes, decomposition of organic compounds, improvement of agricultural products, and water treatment.

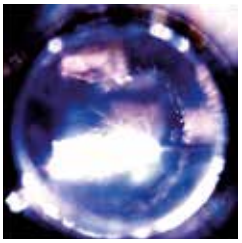
2. 超臨界流体と放電プラズマの融合は、超臨界流体の特異性のために、従来の材料生成とは異なる新しいプロセスを実現する可能性がある。放電プラズマと超臨界流体の相乗効果により、新たな材料合成をめざします。

   Fusion of supercritical fluid and discharge plasma has the potential to realize a novel process different from conventional material creation because of the singularity of supercritical fluid. Our aim is originality material synthesis by synergy effects of discharge plasma and supercritical fluid.

最近の研究実績 Recent Research Results

〈論文／Published Papers〉

- "Anomalous Plasma Temperature at Supercritical Phase of Pressurized CO_2 after Pulsed Breakdown Followed by Large Short-circuiting Current", T. Furusato et al., IEEE Transactions on Dielectrics and Electrical Insulation 25(5) pp. 1807-1813 (2018)
- "A Capacitor Charger with Two Switches for Pulsed Power", T. Ishikawa, et al., IEEJ Trans. on Fundamentals and Materials, Vol.137, No.9, pp. 549-550, (2017), in Japanese.
- "Investigation of Pulsed Breakdown Characteristics in High-Pressure CO_2 including Supercritical Phase under Non-uniform ElectricField", T.Kamagahara et al., Proceedings of International Conference on Dielectric Liquids, IEEE ICDL, pp. 1-4 (2017)
- "Spectroscopic Characteristics of Pulsed Arc Disharge in High-Pressure CO_2 up to Supercritical Phase", T. Furusato, et al., Proceedings of International Conference on Dielectric Liquids, IEEE ICDL, pp. 1-4 (2017)
- "Effects of increasing the repetition rate in nitrogen oxides treatment using pulsed discharge plasma", T. Ishikawa et al., Proceedings of International Power Modulator and High Voltage Conference, IEEE IPMHVC, pp. 645-648 (2016)
- "Study on Pulsed Breakdown Characteristics in High Pressurized Nitrogen Gas Including Supercritical State", Y. Iwasaki et al., Proceedings of International Pulsed Power Conference, IEEE PPC, pp. 438-441 (2015)



超臨界CO_2中のアーク放電

研究室で開発された高速直流充電器