Investigating R&D Committee on Education of Electric Discharge, Plasma, and Pulsed Power Technologies at College of Technology (KOSEN)

Technical Committee on Electrical Discharges,
Plasma, and Pulsed Power Technologies

1. Objective

The engineering applications of discharge, plasma, and pulsed power technologies cover a plethora of applications, from fluorescent lighting, arc welding, plasma cutting, and discharge switching to film deposition, etching, and surface modification in semiconductor manufacturing processes, thrusters using plasma such as ion engines, and foundational technologies for new energy and extreme physical properties such as inertial fusion and shock waves. Discharge, plasma, and pulsed power technology education includes topics such as power supply technologies for the generation and control of pulsed power and the foundations of electrical discharge phenomena in gases, vacuums, liquids, solids, and composite materials thereof. College of technology (KOSEN) students in particular are likely to become engineers who will understand the safe handling of such technologies while applying them in the field; therefore, it is necessary to clarify the current status of discharge, plasma, and pulsed power technology education. For this reason, this Expert Committee will investigate the current status and trends of electrical discharge, plasma, and pulsed power technology education at college of technologies (KOSEN). The results of this investigation will become a future reference for the improvement of educational methods and provide positive examples pertaining to this field. Moreover, this investigation will identify factors necessary for technical education pertaining to discharge, plasma, and pulsed power technology.

2. Background and internal and external research activities

While engineering applications employing discharge, plasma, and pulsed power technologies are diverse, it has increasingly become necessary to strike a balance with basic engineering education owing to the increase in the volume of advanced technology education in line with recent developments in IoT and other factors. The discharge, plasma, and pulsed power technologies with high voltages handled by this expert committee are used in technologies for the safe handling of high voltages, vacuum and measurement technologies for the utilization of plasma, and high-power semiconductor circuit design and high-speed measurement technologies for the generation of pulsed power. However, the number of people who are experts on these technologies is decreasing. Therefore, researchers and educators involved in discharge, plasma, and pulsed power technologies have been invited to join the "Plasma Network of College of Technologies (KOSEN) and Universities of Technology" initiative, which was launched in in 2015. The main emphasis of the above-mentioned initiative is on research, and one of the issues therein is the educational collaboration between college of technologies (KOSEN) and universities. Similarly, many companies lack personnel proficient in the use of the technologies described above owing to the decrease in

the number of engineers involved in related fields in society. We, therefore, believe that it is necessary to have an opportunity to structure the current curricula at college of technologies (KOSEN). Toward this end, we have established this expert committee.

3. Investigative matters

(1) Survey on the present state of discharge, plasma, and pulsed power technology education at college of technologies (KOSEN) (in Japanese)

(2) Survey and organization of educational items necessary for the understanding of discharge, plasma, and pulsed power technologies

(3) Investigation and study on the feasibility of personnel training related to discharge, plasma, and pulsed power technologies as well as collaborations with society

4. Expected effects

An overview of discharge, plasma, and pulsed-power technology education at higher education institutions will not only inform the bottom-up research and development activities of the Discharge, Plasma, and Pulsed-Power Technology Committee, but also lead to a fundamental understanding of educational methods for training engineers in a wide range of interdisciplinary fields, as described above. Furthermore, we are convinced that this survey will inform not only education at college of technology (KOSEN) but also further education at universities and graduate schools. Moreover, it will guide the utilization of these personnel in companies.

5. Term of investigation

April 2022 to March 2025 (3 years)

6. Committee members

Position	Name	Affiliation	Member/Non-member category of IEEJ
Chairperson	Tsubasa Nakamura	National Institute of Technology, Oshima College	Member
Member	Takahisa Ueno	National Institute of Technology, Oita College	Member
〃	Yui Okuyama	National Institute of Technology, Tomakomai College	Member
〃	Kenji Kashine	National Institute of Technology, Kagoshima College	Member
〃	Yoshihiro Kajimura	National Institute of Technology, Akashi College	Non-member
〃	Hiroharu Kawasaki	National Institute of Technology, Sasebo College	Member
〃	Takashi Kikuchi	Nagaoka University of Technology	Member
〃	Kazumasa Takahashi	Nagaoka University of Technology	Member

Position	Name	Affiliation	Member/Non-member category of IEEJ
Member	Shinji Takeshita	National Institute of Technology, Wakayama College	Member
〃	Fumiaki Tanaka	National Institute of Technology, Ishikawa College	Member
〃	Yoshinori Tokoi	National Institute of Technology, Oyama College	Member
〃	Yoshiyuki Hashimoto	Kobe City College of Technology	Member
〃	Youngsoo Park	National Institute of Technology, Anan College	Non-member
〃	Atsushi Minoda	National Institute of Technology, Matsue College	Member
〃	Hiroyuki Yoshiki	National Institute of Technology, Tsuruoka College	Non-member
〃	Masahiro Yoshida	Tokyo Metropolitan College of Industrial Technology	Non-member
Secretary	Toyohisa Asaji	National Institute of Technology, Niihama College	Non-member
〃	Toru Sasaki	Nagaoka University of Technology	Member
Assistant secretary	Yuki Uchida	National Institute of Technology, Nagaoka College	Non-member

7. Activity schedule

Committee meetings: 3 times/year; Secretariat: 3 times/year;

Visit once a year

8. Reporting format

A technical report shall be prepared to present the results.