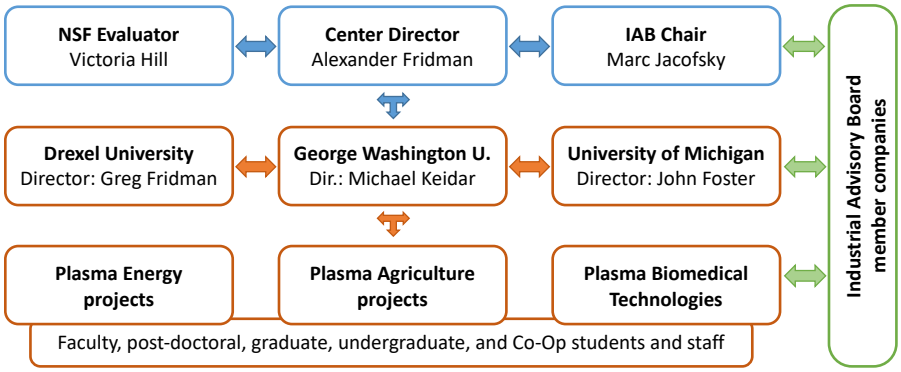
NSF Industry/University Cooperative Research Center (IUCRC) for High Pressure Plasma Energy, Agriculture, and Biomedical Technologies

The National Science Foundation (NSF), through their IUCRC program, is sponsoring the Center for High Pressure Plasma Energy, Agriculture, and Biomedical Technologies (C-PEAB), a collaboration between Drexel University, George Washington University, and the University of Michigan. C-PEAB is focused on partnerships with industry to jointly investigate basic plasma science in support of their development efforts in energy, agriculture, and biotechnology.



C-PEAB organizational structure.

More information about IUCRCs: www.iucrc.org. More information about C-PEAB: www.c-peab.org.

Benefits to the Industry Members: Companies are invited to become members of C-PEAB to benefit from research by the Center in the basic science of their technologies, to have access to graduating students and post-doctoral fellows, and to investigate regulatory considerations at the early stage of technology development. The C-PEAB investigators are developing new plasma technologies addressing, for example, produce disinfection, novel tissue sterilization techniques, water cleaning for industrial and agricultural needs, and high temperature plasmas in the energy sector.

Our current members include companies with interest in non-equilibrium plasmas and their applications in medicine, energy, environmental remediation, microelectronics, and agriculture. Advice from C-PEAB Mentors (representatives of the US regulatory agencies) who participate in the IAB meetings, provides important insight for the Center efforts to introduce plasmas to the global technology market.

We invite representatives of your company to participate in our biannual Industrial Advisory Board (IAB) meeting taking place over 1.5 days as a prelude to formal membership. During the IAB meeting, university researchers present their current projects performed under C-PEAB sponsorship. IAB member companies and Mentors discuss these projects, suggest changes in direction, and vote on funding distribution among the projects. Upon formally joining the IAB, companies have the ability to leverage NSF funding with company membership fees to address research topics aligning with their technology roadmaps. Full ($50,000 annually) and associate ($25,000) memberships are available with the key difference being the ability to vote for projects (details are outlined in the C-PEAB IAB Bylaws). The University overhead costs are reduced to 10% for the membership fees, freeing up more funds for research activities.

C-PEAB IAB members share non-exclusive royalty-free access to the intellectual property the center generates (details are outlines in the Membership Agreement that is uniform for all IAB members). IAB

members are encouraged to and frequently engage in joint grant funding proposal development with the C-PEAB universities and amongst each other.

2019 Projects: C-PEAB projects are voted on by the IAB. Our current collaborative projects are:

- **Plasma chemistry of water and other liquids**, DU, *PI: Greg Fridman*
- **Waste-to-energy and environmental remediation**, DU, *PI: Alexander Rabinovich*
- **Plasma and surface interaction diagnostics**, DU with GWU, *PI: Danil Dobrynin*
- **Plasma simulation validations**, GWU with DU, *PI: Michael Keidar*
- **Plasma-based propulsion**, GWU, *PI: Michael Keidar*
- **Adaptive plasmas for medicine**, GWU, *PI: Taeyoung Lee*
- **Plasma based water purification, a transformative technology**, UM, *PI: John Foster*

Engagement opportunities: To maximize the impact and return of being a member in the C-PEAB, IAB members are invited to:

- Directly engage with university researchers addressing topics of interest.
- Review progress reports of all C-PEAB projects and Center level initiatives.
- Participate in quarterly teleconferences with university researchers to advise on science, technology and regulatory issues.
- Participate in the Center's bi-annual meeting rotating between George Washington University, Drexel University, and University of Michigan (travel expenses and a small registration fee required).
- Access to Research Experience for Undergraduates (REU) and Non-Academic Research Internships for Graduate Students (INTERN) supplemental funding opportunities.

Outcomes: Participation in C-PEAB activities will augment company development activities with advances in the fundamental science underlying the technology; while considering regulatory requirements. IAB participation gives members access to background IP and the human talent (our students) responsible for that IP.

Contact: Please contact Dr. Gregory Fridman, Site Director, Drexel University by email at gf33@drexel.edu or by phone at (312) 371-7947 to learn how to engage in C-PEAB's activities.

Technology background: Low Temperature Plasma (LTP) science provides a base technology upon which many modern industries, such as microelectronics and materials fabrication, have been built. Plasmas are ionized gases produced by electrons accelerated by electric fields. Through electron collisions with molecules, LTPs efficiently generate chemically reactive gases, which in turn produce new functionality through creating new compounds or adding/removing material from surfaces. Food processing, agriculture, fuel conversion, medical, water treatment, and pharmaceutical companies are now applying LTPs to improve the efficiency of processing or create new processes. The use of LTPs for advanced technologies is now restricted by limited scientific understanding of the fundamental underpinnings of the applications—this is the focus of C-PEAB.

For recent review papers in applications areas of medicine, food processing, agriculture and energy, please visit the C-PEAB website: www.c-peab.org/papers.