

Technology Transfer Track Posters

Radio frequency (RF) discharge technology for remote optics cleaning in harsh environments

The University of Basel and F4E have collaborated to develop an innovative RF discharge technology designed for the remote cleaning of optics in harsh environments, such as those found in the ITER fusion device. This technology is crucial for maintaining the accurate monitoring of the fusion device and plasma through optical diagnostic systems, which suffer from severe dust pollution inside the plasma chamber and require regular cleaning.

The research team at the University of Basel has devised a systematic methodology that ensures a consistent level of cleanliness. By investigating the relationship between cleaning time, optics geometry, RF power, and coating type, they identified the optimal parameters for cleaning various optics. Optical emission spectroscopy is employed to remotely determine the cleanliness of the mirrors, allowing for precise monitoring and the establishment of an End-of-Cleaning Indicator (ECI).

This advanced methodology significantly extends the lifetime of optics operating in dirty conditions by ensuring effective and homogeneous cleaning. The ability to clean different types of optics (varying in shape, size, and curvature) and monitor the process in real-time to stop at the appropriate time conserves energy and improves efficiency.

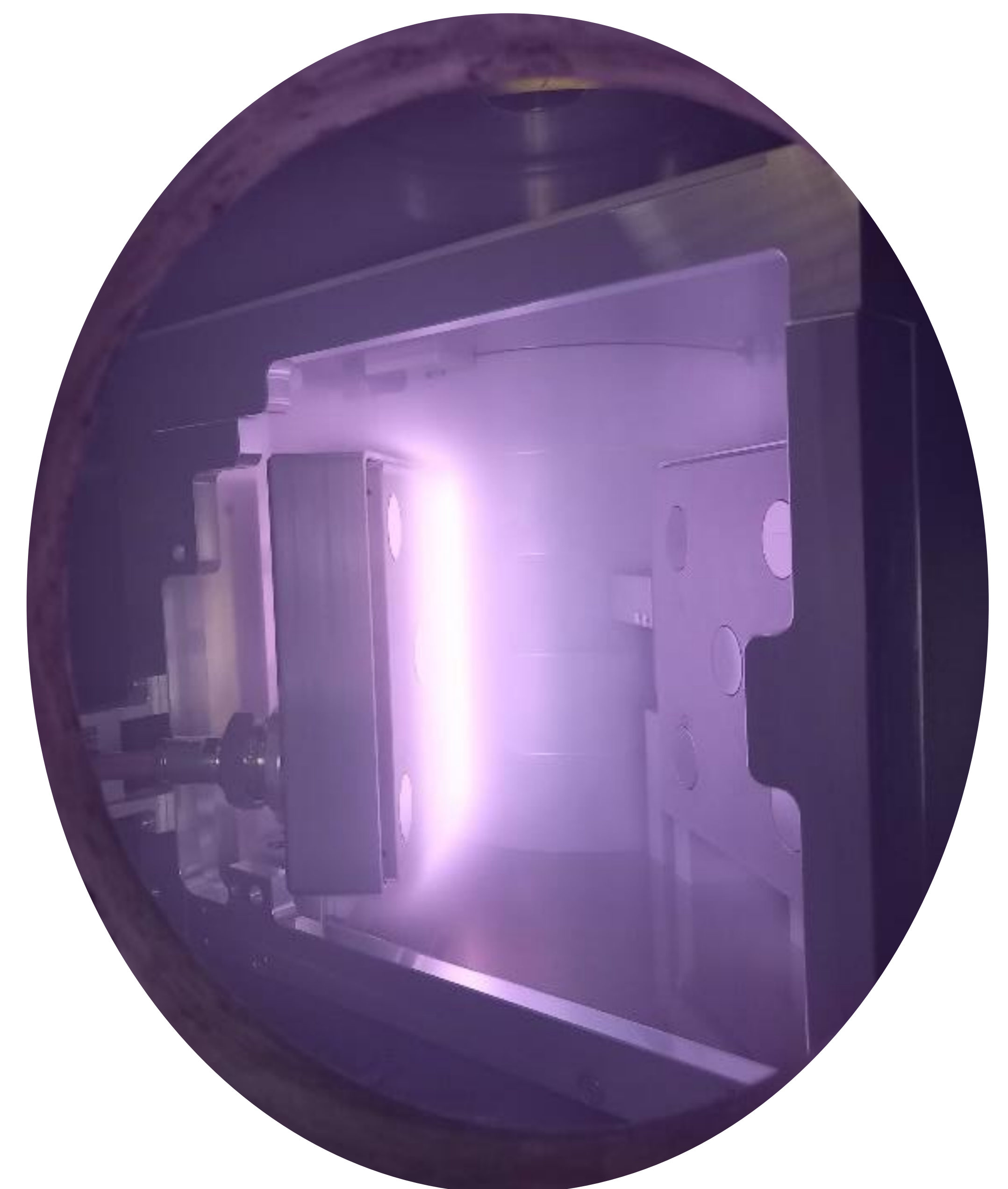
The knowledge and technology developed are not limited to the ITER project but can be applied in various fields where optics require regular cleaning. Potential applications include space propulsion, industrial plasma processes, furnaces, electronics, and biomedical fields. The University of Basel is open to technical adaptation and collaboration opportunities to develop new applications for this RF discharge cleaning technology.

Benefits of the technology:

- Enhanced Optical Longevity
- Optimization of Cleaning Parameters, performing homogenous cleaning and being energy efficient.
- Allows real-time monitoring.

Application Areas:

- Space propulsion
- Industrial plasma processes
- Furnaces
- Electronics
- Biomedical



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