At room temperature, a plasma or glow discharge can be initiated and sustained between two electrodes (a sufficiently high negatively charged cathode and positively charged anode), placed in a gaseous environment at a pressure in the medium vacuum range.

Plasma, defined as a partially ionised gas (typically 0.001 to 10 % of the available atoms and molecules), contains an equal number of positively and negatively charged particles. This allows current to flow through the gas medium, making the gas conductive.

This condition, often called the fourth state of matter, is characterized by a visible glow and increased electric conductivity. The visible glow is caused by the relaxation of excited gas particles. During this process, in which an electron makes a transition from a higher to a lower energy state, energy is emitted, partially in the form of visible light.

The application areas of plasma science are rich and ever expanding, though implementation of plasma techniques have emerged only within the last two decades. Some typical fields, relying on plasma processes are:

- Coating industry (sputter deposition, PACVD)
- Semiconductor industry (more than 30% of all production steps rely on plasma processing)
- Organic industry (treatment of polymers)
- Medical industry (e.g. sterilisation)
- Analytical and diagnostic techniques
- Thermonuclear fusion reactions
- Space science
- Lasers

During the next century, plasma science and technology has incredible untapped possibilities including fustion and many other applications covering the full range of energy and spatial scales.

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