

[P-07]

Wide Parameter Range Pulsed Power Plasma Processing

J. Engemann

University of Wuppertal, Microstructure Research Center-fmt
Wuppertal, Germany

Traditionally technical plasmas that is low-temperature non-equilibrium plasmas are excited by coupling dc, rf or microwave energy into the plasma volume. By changing external parameters such as power, pressure, gas, gas-flow and temperature plasma-based processes can be controlled and optimised to some extent.

However, a selective plasma chemistry prerequisite for high aspect ratio etching or high quality thin film deposition is only partially accessible in this way. A more advanced technological option is to excite the plasma by time-modulated power coupling. In its simplest form this means to pulse the plasma. Important external parameters are the pulse frequency as well as the pulse-on and off times used. This allows to some extent to control the charged particles, radical- and excited species concentrations / fluxes independently. Their respective energy distribution functions also change by varying the pulse parameters.

Furthermore, compared to the cw-mode pulsed power excited plasma sources generally show an extended pressure and power range. This adds increased technological flexibility.

It therefore is possible to tailor plasma-based material processing to an extent not possible before. This talk addresses fundamental aspects of pulsed plasma-processing. Examples of successful applications both in etching, plasma-enhanced chemical vapor deposition and plasma polymerisation will given and explained in detail.