It would therefore be desirable to have an apparatus that allows a HIPIMS process to be performed without complex impulse generator technology and which however could be switched over to a conventional sputtering mode in a simple manner.

According to a first aspect of the present invention, there is provided a method for generating a plasma discharge with a discharge current density that is in at least some areas locally greater than 0.2A/cm2, with the steps of:

- providing a power supply unit with a predefined maximum output
- providing at least two magnetron sputtering sources with a predefined racetrack each and predefined thermal limit, wherein the racetrack is designed so small that when the maximum output of the power supply unit is applied on one each of the magnetron sputtering sources, the discharge current density is greater than 0.2A/cm2;
- by means of the power supply unit, feeding a first output in a first of the at least two magnetron sputtering sources for a first time interval, wherein the first output is chosen sufficiently high so that a discharge current density greater than 0.2A/cm2 is generated at least in one area locally and wherein the first time interval is chosen sufficiently small so that the predefined thermal limit of the first magnetron sputtering source is not exceeded;
- by means of the power supply unit, feeding a second output in a second of the magnetron sputtering sources for a second time interval, wherein the second output is chosen high enough so that so that a discharge current density greater than 0.2A/cm2 is generated at least in one area locally and wherein the second time interval is chosen sufficiently small so that the predefined thermal limit of the second magnetron sputtering source is not exceeded;

characterized in that the power supply unit comprises at least two generators that are connected to one another in a master-slave configuration and in that the two time intervals do not completely overlap.

According to a second aspect of the present invention, there is provided a magnetron sputtering facility with two or more magnetron sputtering sources and one power supply unit, wherein the power supply unit comprises a number of generators that corresponds to at least the number of the magnetron sputtering sources and means are provided that, on the one hand, allow the generators available in the power supply unit to be configured with one master and at least one slave and a switch is provided with which the output of the power supply unit thus configured can be applied in succession to the magnetron sputtering sources and the means, on the other hand, enable the power supply unit to be configured as a number of isolated generators and by means of the switch the power of at least one generator respectively can be brought onto one magnetron sputtering source respectively.

According to embodiments of the invention, ~~this aim is achieved in that~~ a target is subdivided into several independent partial targets that are electrically insulated and which are powered by means of a power supply unit that, in the HIPIMS mode, is configured as a master-slave unit. Master-slave configuration is to be understood as the parallel combination of the outputs of two or more generators, wherein the power setting is selected at one of the generators (the master) and the other generators are connected electronically in such a way that the follow the master in their settings. Preferably, as many generators are interconnected in the master-slave configuration as there are individual electrically insulated partial targets. On the individual partial targets, the power is transmitted in the HIPIMS mode only for as long as their cooling will allow. In the HIPIMS mode, the partial targets are switched on and off in succession. The power supply unit in a master-slave configuration therefore never needs to operate at full power simultaneously for all partial targets. In this manner, a cost-effective generator can be used. If conventional sputtering is required, the master-slave configuration is broken up and an own generator is available to each partial target. A partial target can then be operated with a generator as an independent sputtering source. If after breaking up of the master-slave configuration not as many generators are available as there are partial targets, some partial targets can remain durably switched off or it is possible to alternate the switching. In this manner, switching from the HIPIMS mode into the conventional sputtering mode can easily be achieved.

Preferably, behind each partial target there is a movable magnet system that ensures that the respective racetrack wanders over the respective partial target. If the facility is operated in the HIPIMS mode, according to embodiments of the invention rotating magnet system preferably rotate behind the partial targets with a frequency that preferably forms no rational ratio with the frequency of the recurring power impulse of the sputtering source. This may ensures that material is removed uniformly from the target surface.