IMPULSE™ 20-20 PULSED POWER MODULE

High Power Impulse Magnetron Sputtering

FEATURES OF THE 20-20

⇒ **Plug & Play for Production**

- Add-on to your existing hardware or install an integrated system
- Multiple communications options to meet customer's timing, sync and data needs
- Designed for large area production
- Built for configuration in a 7U rack and water-cooled for production
- Portable unit, team-liftable by two people
- Requires no handling equipment for installation or transport

⇒ **Positive Kick Pulse**

- Controllable positive pulse after each main HiPIMS negative pulse to increase the ion fraction, ion energy & deposition rate to the substrate
- Ideal for roll-to-roll applications on insulating substrates; the KICK adds ion energy without any additional RF bias—improving density and adhesion, and alleviating stress in the film at room temperature

⇒ **Flexible Pulse Topology**

- Range of: 2 kA peak current @ 1 kHz repetition rate for long pulses or larger cathodes to 200A peak current @ 20 kHz for short pulses or higher dep rate and ion fraction

⇒ **Multiplex 20-20 Systems**

- For large rotary or linear magnetrons, multiplex units together for higher power, e.g. 40kW, 60kW, 120kW, etc.

⇒ **Reactive Sputtering**

- Works well with N,O, F chemistries for decorative, functional and corrosion resistant coatings

⇒ **Film Stress Control**

- Adjustable kick pulse parameters enables thick films, such as temperature sensitive substrates

⇒ **Increased Deposition Rate**

- Up to 35% increase in dep. rates have been observed, bringing HiPIMS closer to or exceeding DC sputtering

IMPULSE™ 20-20 Pulsed Power Module

A scaled-up version of the IMPULSE™ 2-2, converting a conventional DC sputtering system into a HiPIMS system

APPLICATIONS

The versatility of the IMPULSE™ 20-20 is suited for:

⇒ Roll-to-Roll, Web, Batch

⇒ Dense, Hard Alloy Films

⇒ Diamond-Like Carbon (at-C)

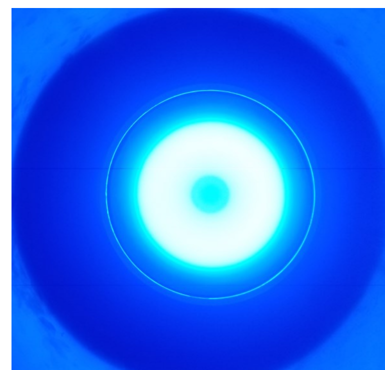
⇒ Decorative Coatings

⇒ Corrosion-Resistant Coatings

⇒ Superior Optical Coatings

⇒ Lubricious, Wear Coatings

⇒ Superconductors



IMPULSE™ 20-20 Pulsed Power Module

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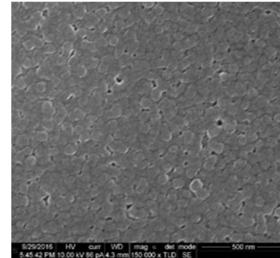
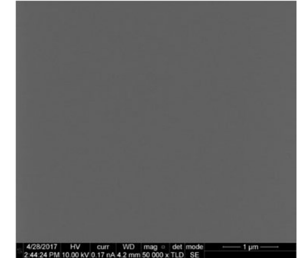
Flexible Pulse Topology

The IMPULSE™ 20-20 architecture allows combinations for sequential and parallel pulse firings to achieve the optimal operating environment for your application. Easily sputtered metals, like copper and aluminum, can draw high peak currents at lower repetition rate. More difficult metals or dielectrics can be effectively managed at high-repetition rate with lower peak currents. Additional supplies can be multiplexed to drive larger cathodes at higher power.





Carbon deposition comparison of conventional DC sputtering (left), with the ultra-smooth, hard, non-porous at-C film with >60% sp^3 provided by HiPIMS (right)

Bias & Synchronization

The IMPULSE™ 20-20 is offered with an optional positive pulse that engages after the termination of the main negative HiPIMS pulse to *enhance ion transport* to the substrate and provide charge clearing on surfaces for reactive applications-broadening the operating envelope. In addition, the IMPULSE™ 20-20 retains the synchronization and substrate bias timing capability introduced with the IMPULSE™ 2-2 to *selectively choose* which ions will implant in the film densification phase. This allows users to tailor the effective substrate bias energy for metal or dielectric ion implantation while minimizing carrier gas ion effects.

Specifications

Input Power Specifications	1 Phase, 100-240 VAC, 50/60 Hz, 3 A
Input Charging Supply	1500 VDC max
Pulse Output Power	20 kW nominal time-average, peak power >1MW achievable
Output Peak Voltage	1250 V nominal, 1500 V max
Output Peak Current	2 kA @ 1kHz, 200A @ 20 kHz
Arc Detection Time	< 500 ns
Peak Current Threshold	User adjustable up to 2kA
Power Limit Mode	User selectable up to 2kW
Pulse Frequency	1 Hz to 20kHz nominal range

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