

NEW!

Desktop SPS System

DR. SINTER · LAB · Jr.

SPARK PLASMA SINTERING SYSTEM

COMPACT + PROFESSIONAL QUALITY

Maximum Current: 1000A DC Pulse
Pressure: 0.5kN {51kgf} ~ 20kN {2040kgf}



The photograph includes optional equipment.

Dr. SINTER LAB Jr. is multifunctional, low-priced, compact spark plasma sintering systems designed for research in the material sciences and engineering. The systems have been developed to perform high-speed sintering of innovative materials such as Functionally Graded Materials (FGMs), nano composite materials and new ceramics - products that are attracting wide attention as we approach the 21st century.

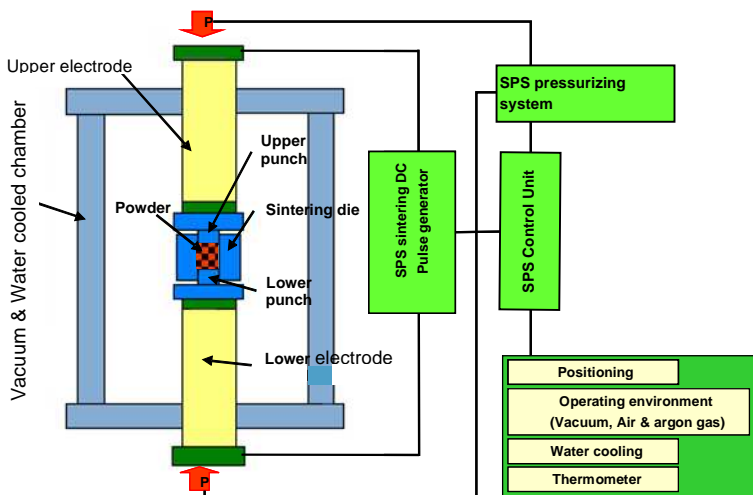
This system is extensively used for research applications - in technical colleges, universities, public institutes and private laboratories. The design concept of the system is basically to allow anyone, even those with little experience or expertise in powder metallurgy to conduct experiments easily and safely. More importantly, This desktop model employs 1000A DC Pulse Generator and AC Servo Pressure System, and enables ultra-high sintering temperature and more precise pressure control even at very low pressure.

Dr. SINTER LAB Jr. is optimal for R&D on new materials. Designed and built as a single system, it has the ability to control grain growth and crystalline structures by using high-speed sintering with rapid temperature rise, and enables experiments on temperature gradient sintering, sinter-bonding of dissimilar materials and material surface treatment. Because of the compact size and affordable price, DR SINTER LAB Jr. is also suitable for the schools of material research.

Principles of Spark Plasma

Spark plasma sintering (SPS) is one of pressure sintering methods. It applies large DC Pulsed Current directly to the powder materials. Large DC Pulsed Current is considered to generate sparks between the powder particles and eventual repeat of momentary ultra-high temperature (upto several thousands deg.-C). This momentary and local ups and downs of temperature will initiate the neck formation among the particles, and the sintering process develops very quickly at substantially lower temperature than the conventional sintering methods. The direct application of DC Pulsed Current will also generate electro-magnetic field which could not be so significant in the conventional sintering methods.

Because of the quick sintering speed and other various features, SPS is a unique and useful tool for sintering, synthesis, and fabrication of materials of



SPS system configuration

Specifications

Sintering Machine	Max. sintering pressure	kN	2.0 {2040kgf}
	Sintering pressure range	kN	0.5 ~ 2.0 {51 ~ 2040kgf}
	Z-axis stroke	mm	100 (Open height 200)
	Max. sintering temperature		2500
	Pressure system		AC Servo Motor
	SPS electrode		With special sealed water cooled system
Water-cooled vacuum chamber		Stainless Steel with front door, vertical cylinder, bore 200mm	
Sintering DC Pulse Generator	Input rating		AC200 / 220V, 3 / 50 / 60Hz, 70A
	Max. output	A	1000
	Pulse control		ON/OFF DC Pulse Control ON / 10 ~ 990ms OFF / 1 ~ 99ms
Outside Dimensions (W x D x H)	mm	1200 x 800 x 1645	

Option :

High Vacuum (6/1000Pa), Pirani Vacuum Gauge, Temperature Program Control Unit, Digital Radiation Thermometer, Analysis Table (Displacement measuring unit, SPS Pressure Program Control Unit, SPS-LCD Display System), Lab Cooler Unit

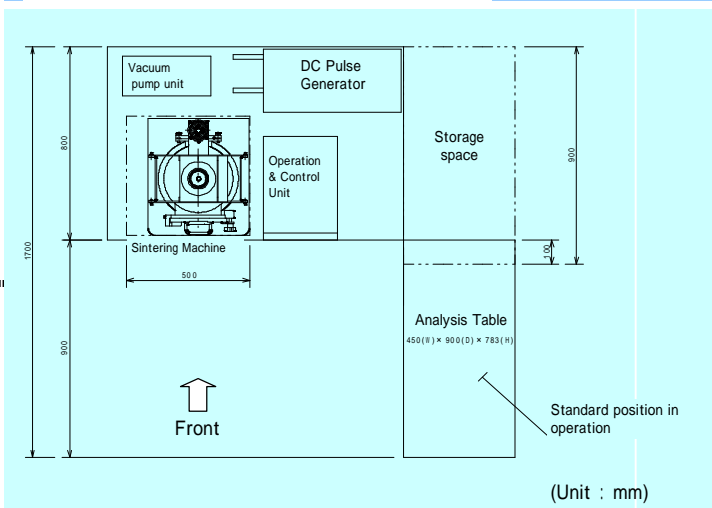
Typical materials for SPS processing

Classification	Materials for SPS processing	
Metals	Fe, Cu, Al, Au, Ag, Ni, Cr, Mo, Sn, Ti, W, Be, Virtually any metal possible	
Ceramics	Oxides	Al ₂ O ₃ , Mullite, ZrO ₂ , MgO, SiO ₂ , TiO ₂ , HfO ₂
	Carbides	SiC, B ₄ C, TaC, TiC, WC, ZrC, VC
	Nitrides	Si ₃ N ₄ , TaN, TiN, AlN, ZrN, VN
	Borides	TiB ₂ , HfB ₂ , LaB ₆ , ZrB ₂ , VB ₂
	Fluorides	LiF, CaF ₂ , MgF ₂
Cermets	Si ₃ N ₄ + Ni, Al ₂ O ₃ + Ni, ZrO ₂ + Ni Al ₂ O ₃ + TiC, SUS + ZrO ₂ , Al ₂ O ₃ + SUS SUS + WC/Co, BN + Fe, WC + Co + Fe	
Inter metallic compounds	TiAl, MoSi ₂ , Si ₃ Zr ₅ , NiAl, NbCo, NbAl, LaBaCuSO ₄ ,	
Other materials	Organic materials (polyimide, etc), Composite materials	

Features

- (1) Dr. SINTER LAB Jr. employs AC Servo Pressure System and is capable of a wide range of pressure and temperature levels. It features temperature range up to 2500 and pressure range of 0.5 - 20kN.
- (2) It is very effective for the development of new materials which have been difficult to fabricate, for example the sintering of porous materials as well as sinter-bonding of ceramic and metal.
- (3) Large Z-Axis stroke (100mm) and Open Height (200mm, between upper and lower electrode) allows versatile tooling configurations.
- (4) A high-performance water cooled chamber, Z-axis position digital indication unit, programmable automatic temperature controller(option), high-speed vacuum exhaust & gas control unit, Pirani vacuum gauge(option) and interlock safety devices are built in. Thus making the system compact but versatile, practical, and easy to use for R&D.
- (5) The main system has a modular configuration to fit in a limited space. The original, user-friendly vertical type chamber construction leaves a wide area for operation so that the user can operate it easily.
- (6) In your pursuit of unique research themes in the field of advanced materials including the development of new inter-metallic compounds, bio-materials and FGMs, the SINTER LAB Jr. is the ideal system for R&D, providing ease of use and low running costs.
- (7) SPS-LCD Display system is provided as an optional item. SPS Sintering parameters are retrieved into PC and shown on the screen as real-time graphic display. SPS sintering parameters such as SPS Current, SPS Voltage, SPS Temperature, additional 3 temperature measured by sheathed thermo couples (type K), Pressure Load, Z-axis displacement, and Chamber pressure (Vacuum level) can be stored in PC as text file which enable the user to read in these data by Excel, etc.
- (8) High Vacuum of 6/1000Pa is available as an option.

Dimensions and Layout of Dr. SINTER LAB Jr.



Specifications are subject to change without notice.



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