



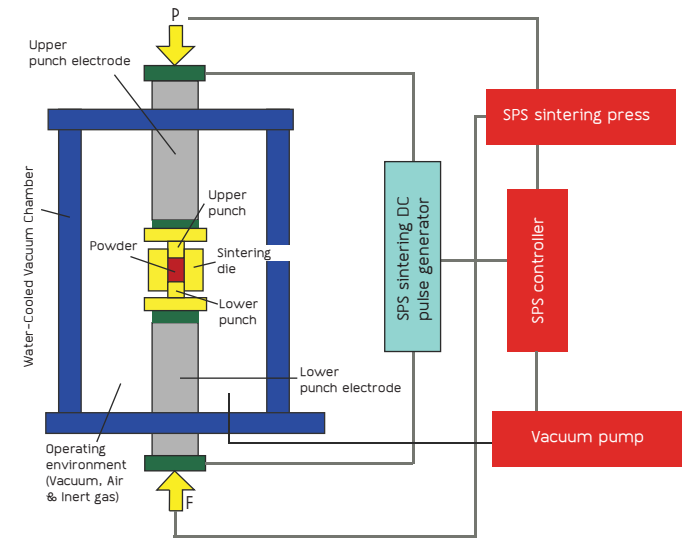
# SPARK PLASMA SINTERING

## Revolutionizing the Consolidation of Advanced Materials

SPS allows for the simultaneous application of temperature and pressure within a controlled atmosphere. The process is simple, repeatable and cost effective, and requires no previous sintering experience.

## IDEALLY SUITED for both advanced research and production applications.

Cal Nano, an industry leader in Nano Material Engineering, is also the exclusive technical and training partner of Fuji SPS, inventor of Spark Plasma Sintering technology. We offer Research and Development services, training, and maintenance of SPS machines.



Newly Available  
211-Lx Ideally Suited  
for Academic  
Institutions \*MK  
Series Shown



## SERVICES

### RESEARCH & DEVELOPMENT

In addition to utilizing SPS for internal developments, we provide R&D services to suit your project needs. Our toll services are designed to meet small and large research initiatives, both for academic institutions as well as commercial efforts.

### EQUIP

For customers whose SPS needs demand their own equipment, our official partnership with Fuji SPS, inventor of Spark Plasma Sintering technology, provides you direct access to the most advanced equipment available.

### USE

#### Consumables

Cal Nano provides both Fuji brand consumables as well as customized tooling for Spark Plasma Sintering

### TRAIN

We provide installation and technical services as the exclusive training and technical partner of Fuji SPS. Cal Nano will also train your personnel to optimize equipment capabilities.

### MAINTAIN

Cal Nano also provides maintenance on behalf of Fuji SPS of your equipment, and updates your operating team on supplemental usage information.

This is the basic SPS system configuration. The powder is packed in the die and set between the upper and lower electrodes inside the chamber. Uniaxial pressure in conjunction with a pulsed DC current then sinters the powder. With this approach, very high ramp rates and sintering temperatures of up to 2400°C are possible within just a few minutes.

## APPLICATIONS

The unmatched ability of SPS in controlling the micro and crystalline structure has revolutionized R&D of materials worldwide. In addition to sintering, SPS demonstrates benefits in alternate processes including bonding and surface treatments.

### APPLICABLE MATERIALS

- Semiconductors
- Fine ceramics
- Functionally graded materials (FGM's)
- Electronics
- Nanophases
- Hard alloy tools
- Diamond tools
- Biomaterials
- Porous materials
- Molds and dies
- Thermoelectrics

## BENEFITS

- Retention of Nano-Grains
- Minimum Time at Temperature
- Diffusion Bonding
- Produces Functionally Graded Materials
- Near Net Shape Capability
- Ultra High Temperatures (+2400°C)
- Capable of low Temperatures
- Minimum Cycle Times
- In-situ Synthesis

Spark Plasma Sintering (SPS) has revolutionized the consolidation of nanomaterials since its invention as the most effective tool for R&D of advanced materials.

## WHO IS FUJI SPS?

Fuji Electric Industrial Co., Ltd. is the pioneer of SPS technology. Fuji researches and develops next generation Spark Plasma Sintering (SPS) technology and fabricating systems for leading edge High Energy Density Processing. Fuji takes pride in manufacturing, marketing, and servicing the finest machines and products internationally.

## FUJI SPS EQUIPMENT LINE

Standard Systems for Research and development of new materials, and academic and vocational training  
DR. SINTER LAB Series (SPS-211Lx/511S/515SS)



Standard systems for new materials R&D  
25 Series (SPS-615/625/725/825/925)



Standard systems for research and production  
(SPS-3.20/5.40/7.40)



SPS Sintering Systems  
DR.SINTER

Automatic SPS production systems with materials handling robot  
DR. SINTER ROBO Series (SPS-9.40)



Production Systems

Fully automated tunnel type SPS manufacturing system



Multi-head SPS system

SPS batch type production system

Specifically designed for production run

Designed for R&D

Specifically designed for R&D of new materials with glove box SPS system with atmosphere control

