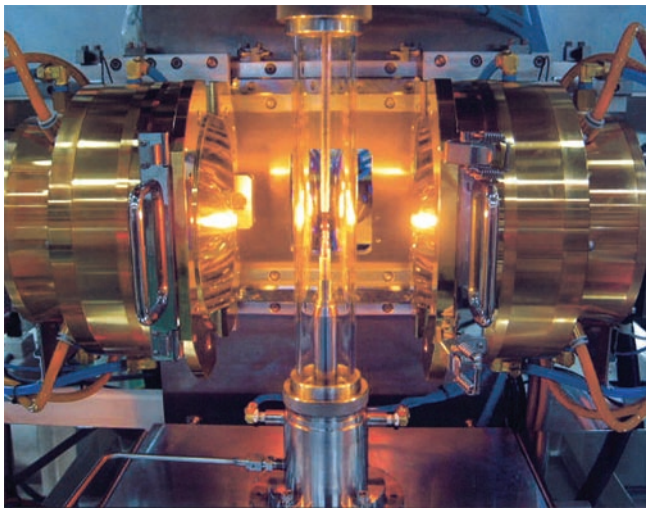
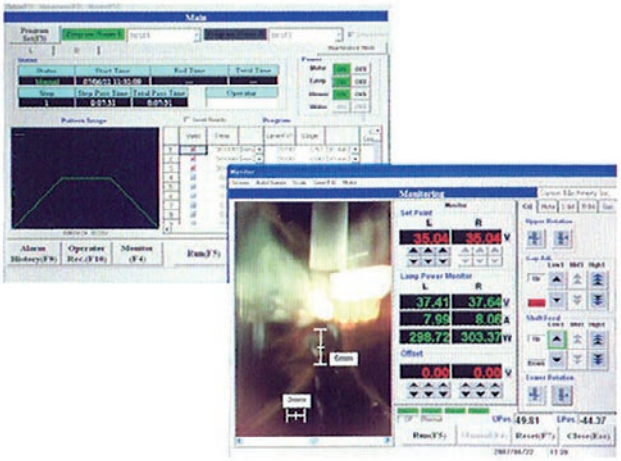
IR Image Furnace

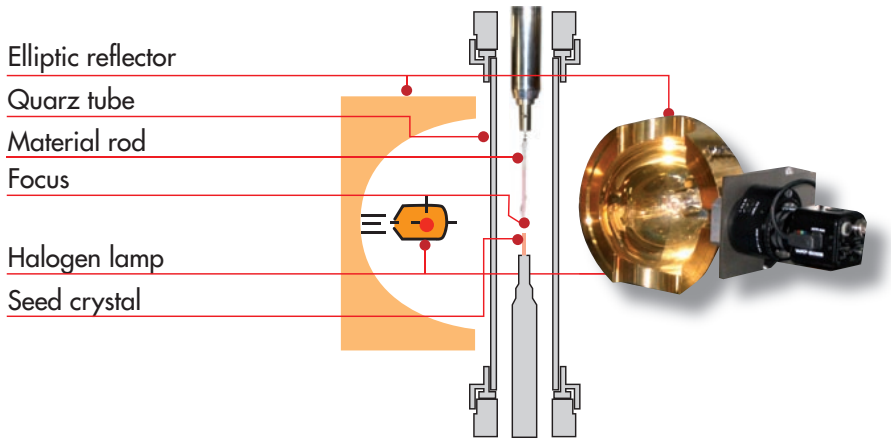
The right solution for all your research needs



Features

- **Temperature Operation**
  IR furnace features high-temperature to greater than 2000 °C.
- **Infrared heat source**
  Unlike high frequency inductive heating units, our infrared heat source is ideal for growing single crystal oxides.
- **Extremely**
  All models employ the floating zone technique, which makes crucibles unnecessary and prevents contamination from impurities, thus ensuring production of a highly pure single crystal.
- **Atmosphere control**
  The floating zone is shielded by a quartz tube, ensuring an ideal atmosphere for growing single crystals. In addition, the pressure is adjustable.
- **Best temperature distribution of vertical direction**
  To keep the floating zone stable for an extended time, the mirror and lamp shapes are optimized to produce the optimum temperature gradient in the axial direction.
- **Stable lamp output**
  The lamp provides stable infrared output over an extended time, leading the reliable control of furnace power.
- **Observation of the single crystal growth condition**
  The crystal growth conditions can be observed in real time via PC.
- **Control with one personal computer**
  Use of a PC makes it possible to perform active control of the drive motor and lamp. In addition, the image of melting conditions that appear on the PC monitor and relevant data can be recorded to a hard disk or other video recording equipment (optional). Remote control from a laboratory or other personal computer is also possible via a local area network.





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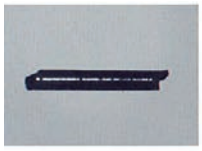
Oxide superconductors

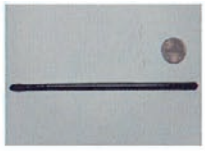


$La_{2-x} Sr_x Cu O_4$ (x=0.10)

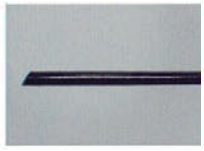
$Nd_{2-x} Ce_x Cu O_4$ (x=0.15)

$Bi_2 Sr_2 Ca Cu_2 Oy$

$Sr_2 Ru O_4$



$La_{2-x} Sr_x Cu O_4$ (x=0.07)



$La_{2-x} Sr_x Cu O_4$

Oxide (including dielectrics and magnetic materials)

Material rods

$YFeO_3$ (Yttrium Orthoferrite)

YIG (Yttrium Iron Garnet Y_3FesO_{12})

$NiFe_2O_4$ (Nickel Ferrite)

Crystals

Material rods

Fe_3O_4 (Magnetite)

YAG

Crystals

Crystals

$MgAl_2O_4$ + NiO (Spinel)

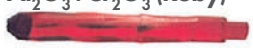
$MgAl_2O_4$ + CoO

$MgAl_2O_4$ + CoO

Material rods

Al_2O_3+Cr_2O_3 (Ruby)

TiO_2 (Rutile)



Crystals

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Canon Machinery's IR furnace are the result of our years of experience and technical expertise.

Our furnaces are the worlds's most widely used equipment that utilizes the floating zone technique. In addition, our furnaces are available in a variety of models and performance levels tailored to almost any research environment, whether industrial group, or private.

Our systems are capable of growing a wide variety of materials including:

- dielectrics
- piezoelectric single crystals
- magnetic materials
- peritectic compounds
- transition metal compounds
- optical crystals
- precious stones

In addition, our systems are compatible with metallic and chalcogen compounds, laser crystals, and the ceramic materials required in super semiconductors.

Our staff is experienced in determining the best system for your required scale of research and available installation space.

Model SC1

The upper and lower crystal growth axis can be driven independently. The crystal growth conditions can be observed and adjusted in real time for added convenience.

Model SC2

By unifying the upper and lower crystal growth axis, the system is made more compact without sacrificing performance. The crystal growth conditions can be observed and the growth and the growth conditions set with the convenience of a PC.

IR Image Furnace – Proven dependability in the rigors of space

In 1992, the space shuttle Endeavor became a topic of great interest in Japan. At that time Canon Machinery's IR image furnace played a major role in the First Material Processing Test (FMPT) conducted by the Japan Aerospace Exploration Agency (JAXA). In this experiment, a high quality large single crystal unable to be grown on earth was successfully produced in space by taking of the near zero gravity environment. The floating-zone type infrared heating single crystal production technology, which Canon Machinery pioneered, was used in this important research. This research is viewed to be highly significant for the future of mankind. We believe that a wide variety of research institutions will continue to be pleased with technology and quality.

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Image furnace standard specification						
		SC1 (independent upper and lower rotating shafts)		SC2 (linked upper and lower rotating shafts)		
		MDH 11020	MDH 20020	EDH 11020	MDH 11020	MDH 10020
Temp. Range	With standard lamp	max 2050 °C 1.5 Kw x 2 pcs (standard)	max 2150 °C 3.5 Kw x 2 pcs (standard)	max 2050 °C 1.5 Kw x 2 pcs (standard)	max 2050 °C 1.5 Kw x 2 pcs (standard)	max 2150 °C 3.5 Kw x 2 pcs (standard)
	Experience	Good experience achieving approx. 2200 °C (meeting point of Sr_2RuO_4)				
Mirror	Mirror type	Double elliptic mirrors				
	Mirror size	Standard (mediium)		Small (E)	Standard (mediium)	
	Crystal diameter	⌀ $6Al_2O_3$+Cr_2O_3	⌀ $8MgAl_2O_4$+CoO	⌀ $6Al_2O_3$+Cr_2O_3		⌀ $8MgAl_2O_4$+CoO
Shaft drive	Lower stroke (max. length of single crystal)	150 mm				
	Upper stroke	250 mm		±25 mm		
	Growth speed	0.5 ~ 50 mm/h		0.13 ~ 1.9mm/h		
	Gap adjustment (medium speed)	1 ~ 300 mm/min.		0.15 ~ 2.3 mm/h (low speed) 12 mm/min. (high speed, 50 Hz))		
	Preparatory operation (high speed)	300 mm/min.		116 mm/min. (50 Hz)		
	Rotation speed	5 – 50 rpm (50 Hz)				
Lamp power	Power supply	DC 110 V/ 20 A x 2 sets	DC 200 V/ 20 A x 2 sets	DC 110 V/ 20 A x 2 sets		DC 200 V/ 20 A x 2 sets
	DC power supply	0.005% of span + 3 mV				
	Overall stability	±0.1% of span				
Atmosphere	Pressure	max. 294 KPa standard, optional to 970 KPa				
	Flow rate	0.5 –5 l/min N_2 gas (flow meter indluded)				
Dimensions	Main unit (WxDxH)	1140 x 1170 x 2250 (appr. 2200 kg)		1000 x 1000 x 1800 (appr. 1100 kg)		
	PC rack (WxDxH)	600 x 625 x 1200 (appr. 60 kg)				
	DC power supply (DxWxH)	Built into main unit		510 x 630 x 700 x1set		500 x 430 x 610 x 2sets
	Control unit	Built into main unit				
	Transformer	Option on case by case basis (TBD)				
	Celling heigt	Approx. 2700 mm		Approx. 2400 mm		
Utilities	Power source (50/60 Hz)	⌀ 3AC 200V 60 A				⌀ 3AC 200V 75A
	Wafer	Approx 5 ~ 8 l/min.				

Options

- **Hydrostatic press unit**
  For compressing
  powder to rodshape specimen

- **Mass flow controller**
  Can be supplied for mixing the different gases for use in the crystal growth.
- **Cold Trap**
  Using the cold trap helps keep the quartz tube free of contamination due to evaporants. This ensures stable heating performance during single-crystal growth. The cold trap is particularly effective for highly volatile materials (patend pending).

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