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高纯CVD碳化硅原料

HIGH PURITY CVD SILICON CARBIDE RAW MATERIAL

材料改变未来

Materials change the future

2025

企业介绍

About Us

Semicera **CVD** Raw Material Process

The equipment is designed for low cost and high efficiency, enabling the production and sales of silicon carbide (SiC) raw materials with internationally leading technology. The product fills a domestic gap and can not only be sold within the country but also exported to otherregions, giving it a long-term co

mpetitive advantage. Traditional silicon carbide raw materials are produced by the reaction of high-purity silicon and graphite, which results in high costs, lo w purity, and small sizes.
Our company’ s fluidized bed technology uses methyltrichlorosilane in a chemical vapor deposition process to generate silicon carbide raw materials, with hydrochloric acid being the main by-product. The hydrochloric acid can be neutralized with alkalis to form salts, avoiding any environmental pollution.

Additionally, methyltrichlorosilane is a widely used industrial gas, which is cost -effective and widely available. Our country is one of the major producers of methyltrichlorosilane.

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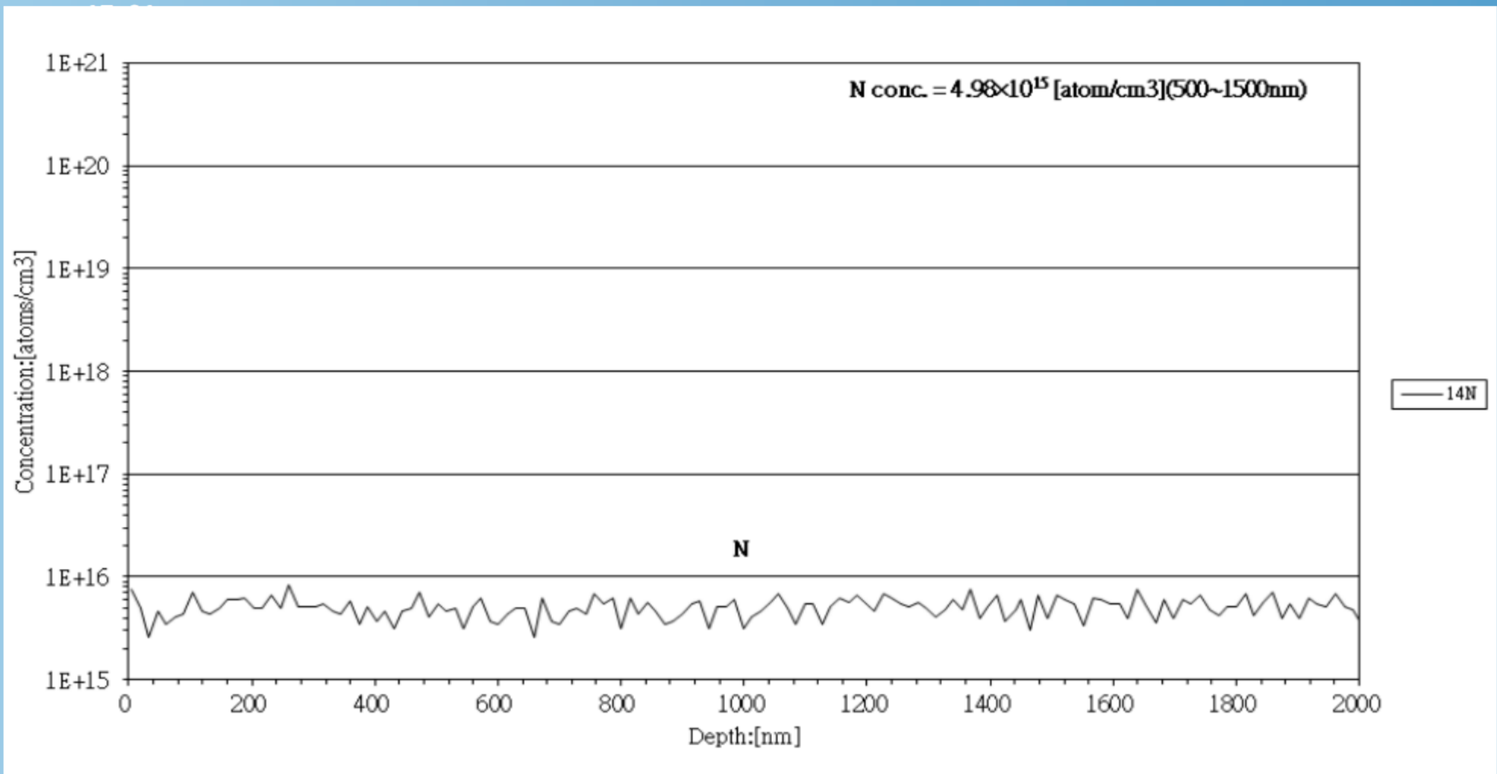
参数介绍

N Concentration in SIC Powder Analysis Using SIMS

A1-24-14



	Substrate	Element	Concentration [AtTom/cm3]	Concentration [ppma]
A1-24-14	SiC	N	$4.98X10^{15}$	0.05

N concentration： **4.98*1015Atom/cm ^{3} 0.05ppm**

RAW MATERIAL PARAMETERS

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Purity 99.9999950%

Customer:	Semicera Semiconductor	*P.O.#*	
Test Date:	10-Oct-2025	*Activity #*	EFSH25100141-GD-21
Customer ID:	Z0306600	*Sample ID:*	266-2510-00512
	SiC Coating	*Report Date:*	11-Oct-25

Element	Concentration [ppm wt]	Element	Concentration [ppm wt]
Li	<0.005	Ag	<0.01
Be	<0.005	Cd	<0.01
B	0.02	In	<0.01
C	Matrix	Sn	<0.01
F	<1	Sb	<0.01
Na	<0.01	Te	<0.01
Mg	<0.01	I	<0.01
Al	<0.01	Cs	<0.005
Si	Matrix	Ba	<0.01
P	0.03	La	<0.01
S	<0.1	Ce	<0.005
Cl	<0.1	Pr	<0.005
K	<0.05	Nd	<0.005
Ca	<0.05	Sm	<0.005
Sc	<0.005	Eu	<0.005
Ti	<0.005	Gd	<0.005
V	<0.005	Tb	<0.005
Cr	<0.01	Dy	<0.005
Mn	<0.005	Ho	<0.005
Fe	<0.01	Er	<0.005
Co	<0.005	Tm	<0.005
Ni	<0.01	Yb	<0.005
Cu	<0.05	Lu	<0.005
Zn	<0.05	Hf	<0.01
Ga	<0.01	Ta	<1
Ge	<0.1	W	<0.05
As	<0.01	Re	<0.01
Se	<0.05	Os	<0.01
Br	<0.01	Ir	<0.01
Rb	<0.01	Pt	<0.01
Sr	<0.01	Au	<0.1
Y	<0.01	Hg	<0.01
Zr	<0.01	Tl	<0.01
Nb	<0.01	Pb	<0.01
Mo	<0.05	Bi	<0.01
Ru	<0.01	Th	<0.005
Rh	<0.01	U	<0.005
Pd	<0.01		

Purity = 99.9999950% (based on observed detection limits)

Advantages of raw materials

Large size and high density

The average particle size is about 4-10mm, and the particle size of domestic Acheson raw materials is <2.5mm. The same volume crucible can hold more than 1.5kg of raw materials, which is conducive to solving the problem of insufficient supply of large-size crystal growth sources, relieving raw material graphitization, reducing carbon wrapping and improving crystal quality.

Higher purity

The purity of raw materials produced by CVD method is higher than that of Acheson raw materials produced by self-propagating method. (2002 Shanghai Institute of Silicates Chen Zhizhan Shi Erwei) The nitrogen content has reached 0.09ppm without additional purification. This raw material can also play an important role in the semi-insulating field.

Low Si/C ratio

Closer to 1:1 than Acheson raw materials produced by self-propagating method, it can reduce defects induced by increased Si partial pressure.

Lower cost

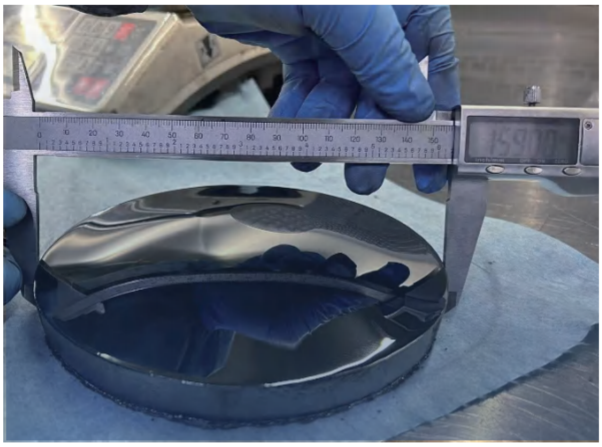
Uniform evaporation rate facilitates process and product quality control, while improving raw material utilization (utilization rate>50%, 4.5kg raw material produces 3.5kg ingot), reducing costs.

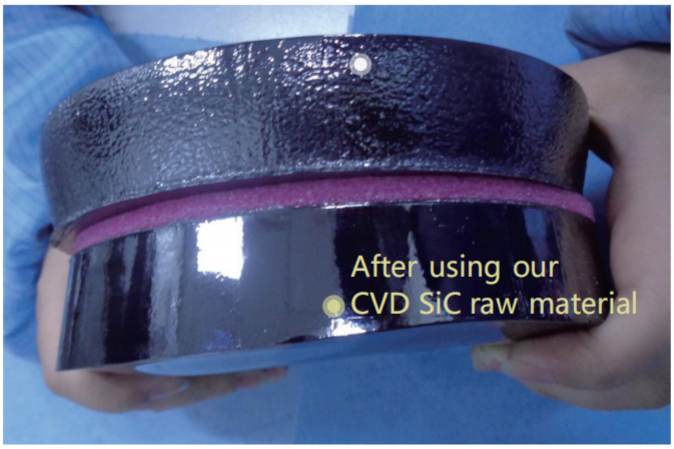
High output

The grown raw materials still maintain the prototype, reduce recrystallization, reduce raw material graphitization, reduce carbon wrapping defects, and improve crystal quality.

Low human error rate

The chemical vapor deposition method avoids impurities introduced by human operation.





原料对碳化硅单晶生长的影响

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摘　要： 研究了具有立方结构的碳化硅 (β-SiC) 粉料在单晶生长过程中的物相变化及对生长晶体均匀性、缺陷等的影响．实验发现，在晶体生长过程中原料的晶型转变和 Si 、C 挥发不一致造成晶体沿生长方向存在一个 Si/C 摩尔比的最大值．晶体中的针孔等缺陷的形成与原料中的杂质和气相组分偏离 Si/C=1 摩尔比有关，并通过电子探针得到证实．

关　键　词： 碳化硅原料；碳化硅单晶；相转变；Si/C 摩尔比；针孔
中图分类号： O 78　　**文献标识码：** A

1　引言

生长 SiC 单晶所需原料纯度应大于 99.999%．原料来源有三种．常用的原料为 Acheson 法生产的 SiC 磨料，因含有较多杂质，使用前需要进行提纯处理．由于受生产工艺的限制，提纯后原料的纯度仍然达不到生长晶体的要求 [1]．高纯 SiC 原料通过 CVD 法或烧结半导体级纯的 Si 和 C 获得，前者得到的原料纯度更高一些． Jayatirtha 等详细报道了后者的合成方法 [2]．Avrov 等研究了原料从立方 (β-SiC) 到六方 (α-SiC) 的相转变 [3]．

SiC 原料的处理过程、颗粒度、晶型对晶体生长有重要影响，这主要是通过改变气相组分的 Si/C 摩尔比实现的． Tairov 等认为 [4~5]，气相组分的 Si/C 摩尔比与原料制备条件、多型有关．对球磨的 SiC 原料而言，总压力和 Si/C 比随颗粒尺寸的减小而增大．如当颗粒尺

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