中国地区

杭州大和热磁电子有限公司（滨江二工厂—AQM）
地 址：杭州市滨江区滨康路668号
电 话：（86）-571-86695021　86695023
传 真：（86）-571-86695024
邮 编：310053
E-mail:crucible@ferrotec.com.cn

Singapore,America

Ferrotec Corporation Singapore Pte Ltd
300 Beach Road#29-04 The Concourse Singapore 199555
Tel: (65)6293-1011
Fax: (65)6291-2918

Ferrotec (USA) Corp.
3945 Freedom Circle Suite 670 Santa Clara, CA 95054
Tel: (408)235-7618
Fax: (408)235-7619

日本地区

Ferrotec Corporation
本社・大阪営業課・海外営業課:
〒541-0053大阪府吹田市豊津町11-34第10マイダビル101号
Tel:(81)6-6310-3600
Fax:(81)6-6310-3611

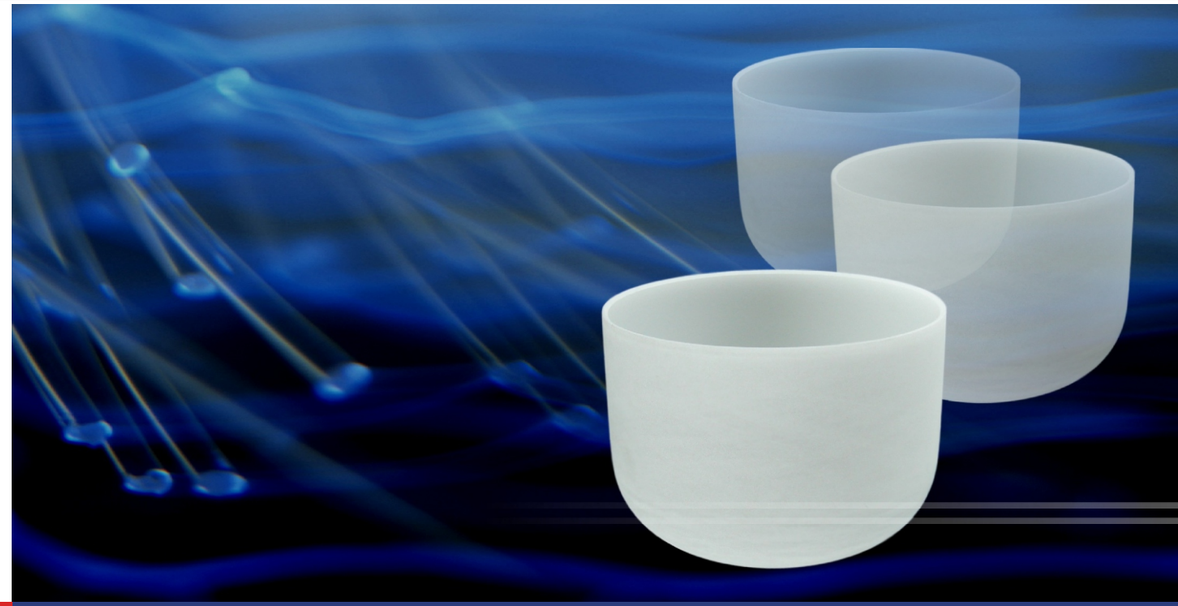
東京営業課:
〒104-0031 東京中央区京橋1-4-14　フエローテツクビル2階
Tel: (81)3-5200-4511
Fax: (81)3-5200-4510

宁夏富乐德石英材料有限公司
FerroTec(Ningxia) Advanced Quartz Material Co.,Ltd

地址:宁夏银川市西夏区经济技术开发区光明西路23号
电话:0951-5676445
网址:http://www.ferrotec.com

NO:2019-03

FerroTec



Quartz Crucible

石英坩埚

宁夏富乐德石英材料有限公司
FerroTec(Ningxia) Advanced Quartz Material Co.,Ltd

AQM

宁夏富乐德石英材料有限公司

FerroTec(Ningxia) Advanced Quartz Material Co.,Ltd

公司简介

宁夏富乐德石英材料有限公司（简称AQMN），是由日本Ferrotec株式会社、杭州大和热磁电子有限公司共同组建的合资企业。创建于2011年4月，于2011年9月正式投产。公司前身是杭州先进石英材料有限公司（简称AQM），延用AQM先进的工艺体系和生产管理，专业从事于半导体、大尺寸太阳能用高规格石英坩埚的研发和生产。

自成立以来，公司便一直是全球主要半导体硅片生产企业的主要坩埚供应商。公司不断优化产品结构，着力技术创新，在AQM的四大系列石英坩埚的基础之上继续优化升级，从而满足国内外客户不断迭代的需求。产品规格无缝覆盖14英寸到32英寸，且具备根据客户需求开发定制更大尺寸的技术能力。公司顺应时代和市场发展，成功转型为以半导体坩埚为主的坩埚制造商，率先在国内开始大口径合成坩埚的研发和制造，并取得巨大成功。此外，公司还斥资对后加工进行洁净厂房及全自动产线升级，不断提升产品品质和稳定性。

Company Profile

高新技术企业

企业名称：宁夏富乐德石英材料有限公司

统一编号：GR201864000053

宁夏回族自治区科学技术厅　宁夏回族自治区财政厅　国家税务总局宁夏回族自治区税务局

二〇一八年十一月二十六日

Ferrotec Ningxia Advanced Quartz Material Co.,Ltd (shortened for AQMN) is a joint venture enterprise which was established by Ferrotec Corporation and Hangzhou Dahe Thermo-Magnetice Co.,Ltd. AQMN was established in Apr.2011 and put into production in Sep.2011.The predecessor is Advanced Quartz Material Hangzhou Co.,Ltd (shortened for AQM), continue to use AQM's advanced progress system and production management, specialized in the design & manufacture of high quality quartz crucibles for semi-conductor large size solar energy use.

Since the establishment, AQMN has been the main crucible supplier for the world's semi-conductor wafers. The company optimized the product structure continuously and focused on technological innovation,optimized and upgraded on AQM's 4 series quartz crucible so as to satisfy the iterative requirements of domestic and international customers. The products coverage 14 to 32 inch and have the technical capacity to develop & customize larger size according to the customer's requirements. AQMN conform to the development of times and market, had been transformed into the crucible manufacturer which mainly for semi-conductor, AQMN had been the first to develop & manufacture the large caliber crucibles in China and had achieved great success. Moreover, AQMN invested in the post processing of clean plant & fully automatic production line upgrade, to promote the products' quality and stability.

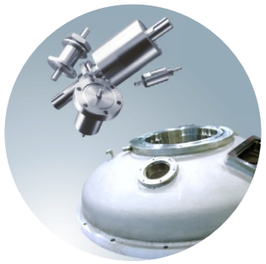
公司历程　2010-2018

Development Path 2010-2018

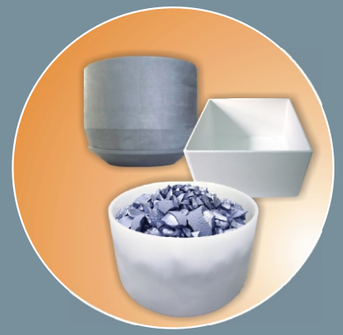
2010年12月	开始筹建 Dec.2010 start to establish
2011年04月	正式成立 Apr.2011 established
2011年09月	生产进入量产,产能达到 5000/月 Sep.2011.The production goes into mass production and the capacity can reach 5000/month.
2012年05月	扩大产能至10000/月 May.2012 Enlarge the capacity to 10000/month
2012年10月	公司通过ISO等三体系认证 Oct.2012 passed the ISO and so on systems certification
2013年06月~ 2015年11月	陆续通过国内外客户的审核，生产顺利转移至银川工厂。 Jun.2013-Nov.2015 passed the audit of domestic & international customers, the Production transferred to Yinchuan plant successfully.
2016年12月	后道工序全自动化项目开始启动 Dec.2016 The automatic program of the post processing was start.
2017年05月	新型坩埚AQM-42研发完成 May.2017 The R&D of new type AQM-42 was finished.
2017年09月	新型坩埚AQM-31研发完成 Sep.2017 The R&D of new type AQM-31 was finished.
2018年02月	大尺寸石英坩埚 32英寸研发完成 Feb.2018 The R&D of large 32 inch quartz crucible was finished.
2018年11月	后道工序全自动化设备就位，厂房改造完成 Nov.2018 The automatic equipment of the post processing was ready and the reform of the plant was finished.
2018年11月	2018年11月通过国家级高新技术企业认证 Nov.2018 passed the certification of new high-tech enterprise in national level.
2018年12月	后道工序全自动化设备进入调试，预计2019.3正式投产 Dec.2018 The automatic equipment of the post processing was into debugging, it was expected put into production in Mar.2019.

自动化生产设备

Automated production equipment



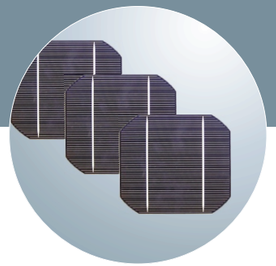
半导体/平板显示
Semiconductor/FPD Business



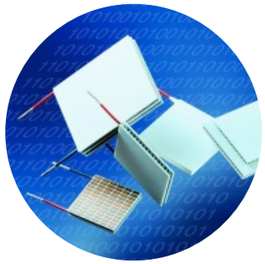
太阳能
Solar Business

FerroTec

电子材料
Electric materials Business



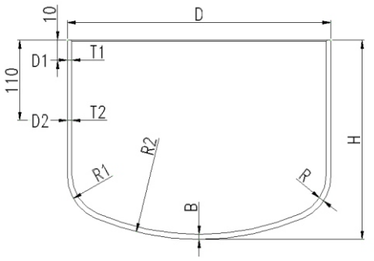
精密机械
Precision Machanics Business

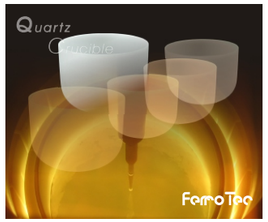


产品系列
Product Series

AQM-10	内壁涂透明层的天然石英坩埚。适用于：太阳能单晶硅的拉制。 Natural quartz crucible with transparent layer in the inner wall. Apply to: the crystal pulling of the solar energy single silica.
AQM-20	高纯天然石英坩埚，在AQM-10的基础之上增加高纯天然砂，内表面纯度较高。适用于:半导体和太阳能单晶硅的拉制，主推型号：AQM-21。 High purity natural quartz crucible, increase high purity natural sand on the basis of AQM-10, with high purity in the inner surface.Apply to: the crystal pulling of the semi-conductor & solar energy. Main type: AQM-21
AQM-30	合成石英坩埚，内表面纯度更高，适用于高级别硅棒的拉制。适用于：半导体单晶硅的拉制，主推型号：AQM-31。 Synthetic crucible with higher purity in the inner surface, apply to crystal pulling for the high level silicon rod; Apply to: crystal pulling of the semi-conductor single silicon. Main type: AQM-31
AQM-40	内表面结晶化的天然石英坩埚，适应多次加料工艺，长时间使用。适用于：太阳能和半导体单晶硅的拉制，主推型号:AQM-42。 Natural quartz crucible with inner surface crystallization, adapt to multiple charging process and long time using. Apply to: crystal pulling of the solar energy & semi-conductor. Main type: AQM-42

产品尺寸规格
Dimension & Specification of the Products





单位(Unit)：mm

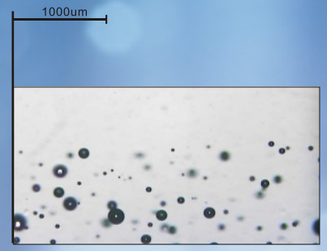
项目/Item		16″	18″	20″	22″	24″	26″	28″	32″
外径 Outer diameter (mm)	D1	404±2	457±3	507±3	556±3	611±3	656±3	705±3	810±3
	D2	404±2	457±3	507±3	556±3	611±3	656±3	705±3	810±3
厚度 Thickness (mm)	T1、T2	8.5±2	9±2	10(-2/+3)	11(-2/+3)	11(-2/+3)	12(-2/+3)	13(-2/+3)	16±4
	TR	8.5±2	10±2	11(-2/+3)	12(-2/+3)	12(-2/+3)	12(-2/+3)	13(-2/+3)	23±5
	TB	8.5±2	10±2	11(-2/+3)	12(-2/+3)	12(-2/+3)	12(-2/+3)	13(-2/+3)	16±4
真空透明層 Vacuum transparent layer (mm)	W	≧2.5	≧3.0	≧3.0	≧3.0	≧3.0	≧3.0	≧3.0	≧3.0
	R	≧2.5	≧3.0	≧3.0	≧3.0	≧3.0	≧3.0	≧3.0	≧3.0
	B	≧2.5	≧3.0	≧3.0	≧3.0	≧3.0	≧3.0	≧3.0	≧3.0
R形状 R shape	R1	90	120	90	110	120	120	120	160
	R2	406	500	508	558	610	660	711	810

备注:以上为我司标准尺寸，实际尺寸规格可按照客户要求进行定制。

Remark: Above are AQMN's standard dimensions, the actual dimension spec can be Customized by the customers' requirement.

产品特点
Product Feature

使用前石英坩埚的切面图
Cross section before use



使用后石英坩埚的切面图
Cross section after use

高DF率

石英坩埚是单晶硅的拉制过程当中必不可少的部件，它的性能对单晶硅的成晶率有较大影响。这是因为当坩埚的内表面产生失透时，石英结晶体就有可能脱落，继而粘附在单晶硅上从而降低成晶率。我司生产的石英坩埚不易失透并具备以下两个特点：

1） 透明层中少气泡化
2） 内表面高纯化

本公司生产的石英坩埚，透明层中基本无气泡。且当前的主推型号（AQM-21，AQM-31，AQM-42）采用了特殊的加工技术，使得该系列产品在使用过程当中，可以抑制不透明层中的气泡膨胀，大幅提升石英坩埚在高温下的使用寿命。以下是此种工艺生产的坩埚使用前后的切面情况。

High DF rate

Quartz crucible is an essential component in the process of the mono-crystal silicon pulling whose performance has great influence on the crystallization rate. This is because when divirtrification occurred on the inner surface, the crystallography may fall off then adhere to the single silicon,thus to reduce the crystallization rate. AQMN's crucibles aren't easily to form devitrification and have the following 2 characteristics:

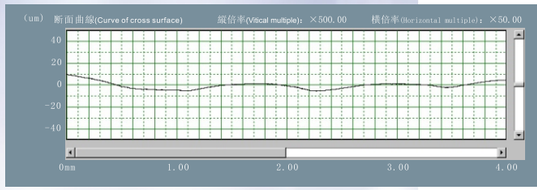
1. Less bubble in the transparent layer
2. Inner surface high purification

Quartz crucibles produced by our company, there are no bubbles in the transparent layer. The current main type (AQM-21, AQM-31, AQM-42) all adopt special process technology, then make the series can restrain bubble expansion in the back-up layer and promote the service life under high temperature drastically. The following is the cross section of the crucibles produced by this technology before and after use.

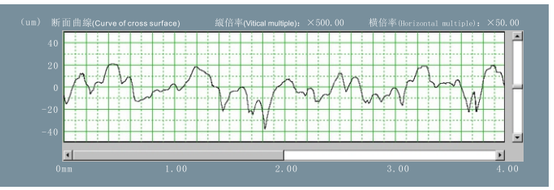
为了达到内表面高纯度化，我们从原材料以及生产控制两个方面进行管控。原材料方面，我们精选国际知名石英砂厂家，以确保原料纯度。生产控制方面，各工序严控金属元素污染，并通过各种精密分析仪器对金属元素等污染进行定期分析监控。

此外，我们还研发出独特的涂层工艺，目的是在坩埚表面形成一层致密的结晶层，降低石英坩埚与硅液的反应程度，防止石英结晶体脱落进入硅液影响单晶硅的成晶。AQM-40系列即采用此种工艺。

以下是我司对有涂层系列坩埚（AQM-40）使用后的内表面粗糙度和无涂层系列坩埚（AQM-10）进行分析，涂层坩埚使用后的内表面粗糙度在不同深度里更均匀，即体现了涂层所起到的降低反应程度的作用。



使用后AQM-40内表面粗糙度数据



使用后AQM-10内表面粗糙度数据

In order to achieve inner surface high purification, AQMN make control from Raw material & production control. As for the raw material, we choose international well-known quartz sand manufacturers to ensure the purity. As for the production control, metal elements are strictly controlled in all process, regular analysis & monitoring for metal elements etc. other contamination are done by variety precision analytical instruments.

Moreover, we also develop special coating technology to form a compact crystallizing layer on the inner surface of the crucible, to decrease the reaction of quartz crucible & silicon liquid, to prevent crystallography falling off into the silicon liquid, then influence the crystallization of single silicon. AQM-40 series are using this technology.

The following are the analysis of interior surface roughness of coating series (AQM-40) & uncoated series (AQM-10) after using, the interior surface roughness of coating crucibles after using is more symmetrical in different depth , that reflects the effect of coating on reducing the reaction level.