WORLDIA®

Pure Sound Quality Diamond Tweeter Dome

To interpret the high pitch beloved by audiophiles

Pure Diamond/Original Sound Enjoyment
Delicate Sound Quality/Wide Frequency Response

BEIJING WORLDIA DIAMOND TOOLS CO.,LTD.

WORLDIA®

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WORLDIA

- Focus on new materials and high-end tool manufacturing, shaping the world's quality.
- Shaping your world with diamond.

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WORLDIA
Company Profile

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One of first 25 companies listed in China STAR Stock Market in 2019. (Stock Code :688028)

309

More than 309 technical patents, including 79 invention patents (as of June 2024)

1400

Globally 1400 employees

Worldia Group

Beijing Worldia Diamond Tools Co.,ltd.

- Beijing Worldia (Dachang)
- Jiaxing Worldia
- Shenzhen Xinjinquan
  - Huizhou Xinjinquan
- Worldia (Jiaxing) Cemented Carbide CNC Tools
- Langfang Worldia
- Worldia Europe GmbH
- Worldia Nice Nova Diamond Technology
- Worldia Nice Nova Diamond
- Langfang Supower
- Langfang Feite

Company History

2000 — Worldia predecessor Beijing Supower Technology Development Co., Ltd. is established

2006 — Worldia is registered

2010 — New factory(Hebei Langfang) in operation

2015 — Completed the shareholding system transformation

2016 — The production base in Jiaxing, Zhejiang Province began to be established

2019 — Listed in China Star Market in 2019

2021 — Layout of Cemented Carbide CNC Tools project

2022 — Completed major asset restructuring. The first overseas subsidiary is established

2024 — Promoting internationalization strategy

>> Continue to expand product portfolio development and broaden manufacturing and sales footprint

Made In China For The World

- Building area greater than 100,000 square meters
- Imported manufacturing and testing equipment, made or independently developed by Switzerland, Germany, the United States, and Japan
- ISO9001/GB/T 19001 ISO14001/GB/T 24001 ISO45001/GB/T 45001

Beijing Worldia (Dachang)
(20000m²)

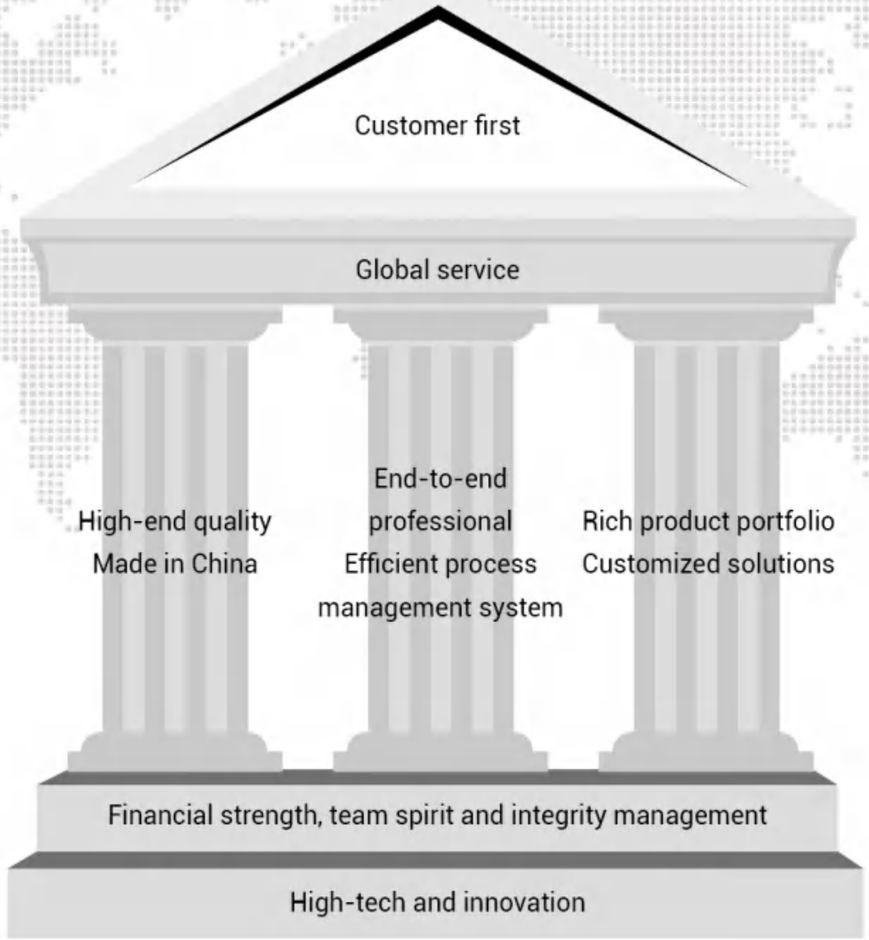
Langfang Worldia
(40000m²)

Jiaxing Worldia
(79000m²)

Shenzhen Xinjinquan
(12000m²)

Huizhou Xinjinquan
(22,000m²)

By focusing on technological innovation, lean manufacturing and meeting the high quality standards of global customers, Worldia has been highly recognized by the industry and the customers it serves.
We will continue to improve and enrich our product line to meet customer needs with efficient product design and solutions.



Characteristics and Applications of Diamond Functional Materials

CVD diamond, as a multifunctional material, has excellent hardness, low friction coefficient, high elastic modulus, high thermal conductivity, high insulation, wide bandgap, as well as excellent sound propagation speed and chemical stability. These characteristics make it show great application potential in the fields of high-frequency and high-power electronic components heat dissipation, acoustic devices, sensors, wear-resistant devices, optical windows and quantum information. Worldia diamond functional materials Business is positioned in the global high-end new materials market. Worldia is one of the few companies in China that can master the three main CVD techniques, with products ranging from diamond film acoustic devices, diamond heat sink materials, diamond optical windows, diamond cutting tools, to boron-doped diamond film coating electrodes and CVD lab-grown diamonds, etc.

Hardness	8000~10000Kg/mm²
Tensile strength	272 Kg/mm²
Compressive strength	9.8×1013 Kg/mm²
Friction coefficient	0.05~1
Young's modulus	1050GPAa
Density	3.51g/cm³
Coefficient of thermal shock	107W/m
Poisson's ratio	0.1
Thermal conductivity	550~2000W/(m·K)
Coefficient of thermal expansion	2.3×10-6/℃
Resistivity	~106Ω·m
Relative dielectric constant	5.7
Electron mobility	2200cm²/V·S
Hole mobility	1800cm²/V·S
Saturated electron drift velocity	2.5×107cm/s
Band gap	5.45ev

BDD electrode

CVD large single crystal diamond heat sink wafer

Diamond Tweeter Dome

CVD polycrystalline diamond heat sink wafer

Diamond Tweeter Dome

Unbelievably clear and bright, pure

Diamond is the ideal tweeter material due to its extremely high hardness and rigidity, excellent sound transmission speed, low density and high sound damping, high frequency response, low distortion and high purity, and high power bearing capacity. It can bring extremely pleasant treble, improve the sound quality and listening experience. Diamond tweeter units have been widely used and recognized in high-end audio equipment and professional recording studios.

Product Introduction

Diamond tweeter dome, as revolutionary acoustic material, is prepared by chemical vapor deposition (CVD). This process not only retains the natural advantages of diamonds - excellent rigidity and power-bearing energy, but also cleverly transforms these characteristics into a wonderful experience in the audio field.

The diamond is processed into an extremely light and thin tweeter dome, which cause better sound transmission speed and frequency response capability. Compared with traditional metal tweeter dome, it effectively solves the problem of low frequency of splitting and breaking. By increasing the resonance point, it ensures the stable and undistorted sound quality in the high-frequency range. Secondly, the ultra-high frequency response of the diamond tweeter dome enable it to easily exceed the 20kHz limit of the human ear, thus bringing more delicate and realistic sound experience.

With its unique material advantages and exquisite production technology, the diamond tweeter dome has demonstrated excellent performance and broad application prospects in high-end audio equipment, speakers and microphones, improving the overall sound quality of audio equipment and bringing immersive listening enjoyment to music lovers and professionals.

Advantages of Diamond Tweeter Dome

Light Weight

The lower the material density, the easier it is to be controlled by the voice coil, the higher the electroacoustic conversion efficiency, the less detail loss, and the more prominent the high-frequency bright characteristics.

Rigidity

The tweeter dome moves in the confrontation with the air. The air pressure is constant, but the speed (frequency) and amplitude of the tweeter dome are changing. The more intense the tweeter dome moves, the greater the air pressure it bears. The mechanical property that reflects the rigidity of the tweeter dome is Young's modulus (longitudinal stress). If the Young's modulus is low and insufficient to counteract the reaction force of the air, the tweeter dome will deform and produce serious distortion.

Fast Speed

The solid sound velocity of the tweeter dome is determined by the specific modulus in mechanics (the root of Young's modulus/material density). The higher the Young's modulus and the lower the density, the higher the sound velocity. The high frequency of high-frequency vibration requires a very fast sound velocity conduction to meet the high-frequency response requirements, otherwise it is easy to cause a series of distortions such as offset distortion and split vibration distortion.

Thermal Expansion

The temperature generated by the motion of the voice coil will be transmitted to the tweeter dome. If the tweeter dome has a high coefficient of thermal expansion, it will expand due to thermal conduction, resulting in a sound explosion and severe background noise.

Hardness

The mechanical index that reflects the strength of the tweeter dome is the Poisson's ratio, which is the ratio of the transverse stress of the material to the Young's modulus (longitudinal stress). The larger the Poisson's ratio, the greater the transverse stress of the tweeter dome, the smaller the tweeter dome strength, and the greater the "explosion" distortion.

Dynamics

The dynamics of atomic and ionic structures are beating, while the dynamics of molecular structures are creeping. The former is more efficient but has low acoustic impedance and high background noise; the latter is less efficient but has high acoustic impedance and low background noise. From the perspective of research and development, it is impossible to change the dynamics of metal and "ceramic like" or "diamond like" tweeter dome. Only by optimizing their rigidity and strength from the perspective of molecular structure can there be infinite possibilities.

Shape

"Hemispherical dome" is not the absolute geometric shape of the tweeter dome. The lower the arch height, the easier it is to make the curve flat. The arch height ratio must be coordinated with the mechanical properties of the material to produce a standard performance.

Equilibrium

This refers to a method of applying classical Chinese wisdom to tweeter dome acoustic design. In traditional Chinese thinking methods, holism, dialectics, and neutralization are the advanced levels of human thinking methods. "The Unity of Heaven and Man"is the theory of holism, "The Tao that can be told is not the eternal Tao"is dialectical, and "a balance of Yin and Yang" is neutralization.

Main Features

1. The diamond tweeter dome has good rigidity and lightweight , so it can respond quickly to high-frequency signals. The upper frequency limit is up to 6kHz;
2. The diamond tweeter dome has excellent chemical and thermal stability, and is not easily affected by the external environment, therefore it has long-term stable performance;
3. The diamond tweeter dome has extremely high hardness and wear resistance, therefore it has a long life and high reliability;
4. The diamond tweeter dome has good thermal conductivity, which can effectively dissipate heat, and ensure the stability and reliability of the equipment;
5. The longitudinal wave sound velocity is as high as 20,000m/s, which is more than three times that of the commonly used tweeter dome materials such as aluminum and titanium.

Performance Parameters of Diamond Tweeter Dome

Hardness/GPa	70-100
Density/(g/cm^3)	2.8-3.5
Melting point/°C	Close to 4000
Elastic modulus/Pa	1.04x1012
Chemical stability	Insoluble in any acid and alkali
Friction coefficient	0.08-0.1
Thermal conductivity at room temperature/(W/m.k)	2x1013

The Influence of Tweeter Dome Shape on Sound Quality

1. The greater the arch height, the greater the time difference of the voice coil force conduction path, the greater the risk of frequency cancellation, and thus the greater the unevenness of the curve.
2. From the perspective of tweeter dome shape factors, the arc flatness of the tweeter dome shape is proportional to the flatness of the curve. However, the arc flatness of the tweeter dome is inversely proportional to the rigidity of the tweeter dome. The smaller the arch height ratio, that is, the higher the flatness, the smaller the rigidity. The smaller the rigidity of the tweeter dome, the higher the distortion of vibration deformation.
3. The shape of the treble sound wave radiation is very narrow. If the directivity of the pure flat tweeter dome is very narrow, it is not easy to obtain an ideal sound field coverage. The arc top tweeter dome has a wider direction and obtains better sound field coverage. Therefore, the shape of the dynamic tweeter dome of the high-end speaker should be based on the acoustic characteristics of the material, and on this basis, the optimal balance of factors such as arch height, area, force conduction, and curve should be obtained.

Diamond Tweeter Units

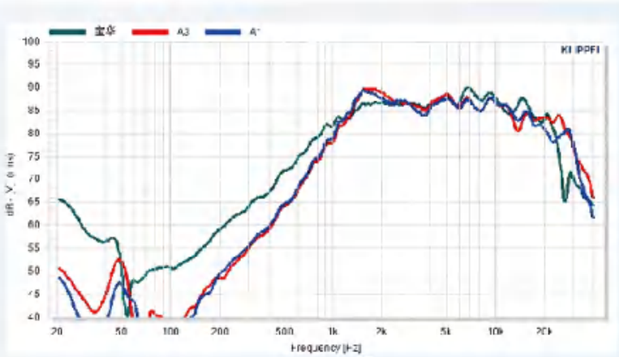
In today's world where audio technology is changing with each passing day, people's ultimate pursuit of sound restoration is driving audio equipment to continuously break through boundaries. The sound quality fidelity of tweeters has become a bright star jointly explored by the fields of materials science and electroacoustic engineering. Faced with the severe challenge of high-frequency sound waves on speaker tweeter dome, the key to ensuring accurate and distortion free sound transmission lies in the improvements of tweeter dome.

CVD (Chemical Vapor Deposition) diamond tweeter dome technology has emerged, which is like a key that unlocks the door to high pitched sound quality. The diamond tweeter dome has redefined the standard for speaker tweeter dome with its outstanding stiffness, excellent internal damping, and extremely light weight. Its rigidity ensures that it can maintain a stable shape even under high-frequency vibration, effectively resisting deformation caused by sound wave impact and reducing sound distortion. And internal damping effectively suppresses unnecessary vibrations, making the sound purer and clearer. In addition, the low density of diamond tweeter dome itself further enhances the propagation efficiency and response speed of sound.

Therefore, the tweeter with diamond tweeter dome can not only accurately reproduce the delicacy and passion of each note, but also show unprecedented clarity and penetration in the high pitch area, making every listening experience a soul-stirring auditory feast. This is not only a technical victory, but also a vivid interpretation of the endless pursuit of sound art.

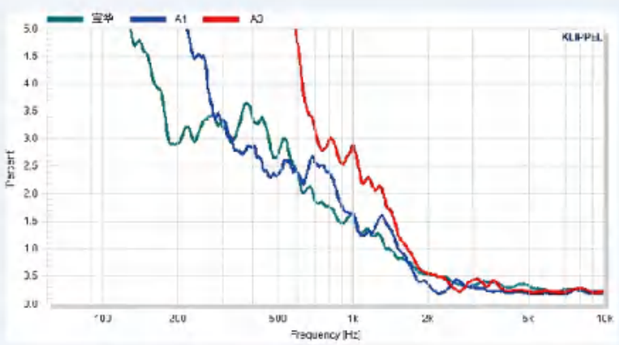
Fundamental + Harmonic distortion components

Signal at IN1



Harmonic distortion (relative)

Signal at IN1



Diamond tweeter dome, as a new high-pitched tweeter dome material that has attracted much attention in the audio field, stands out for its extraordinary physical properties. It has an extremely high elastic modulus, ensuring the stability and response speed of the tweeter dome under high-frequency vibration. At the same time, its extremely low mass density makes sound propagation faster, with a longitudinal wave speed of up to 18,000 meters per second, which is more than three times faster than traditional tweeter dome materials such as aluminium and titanium.

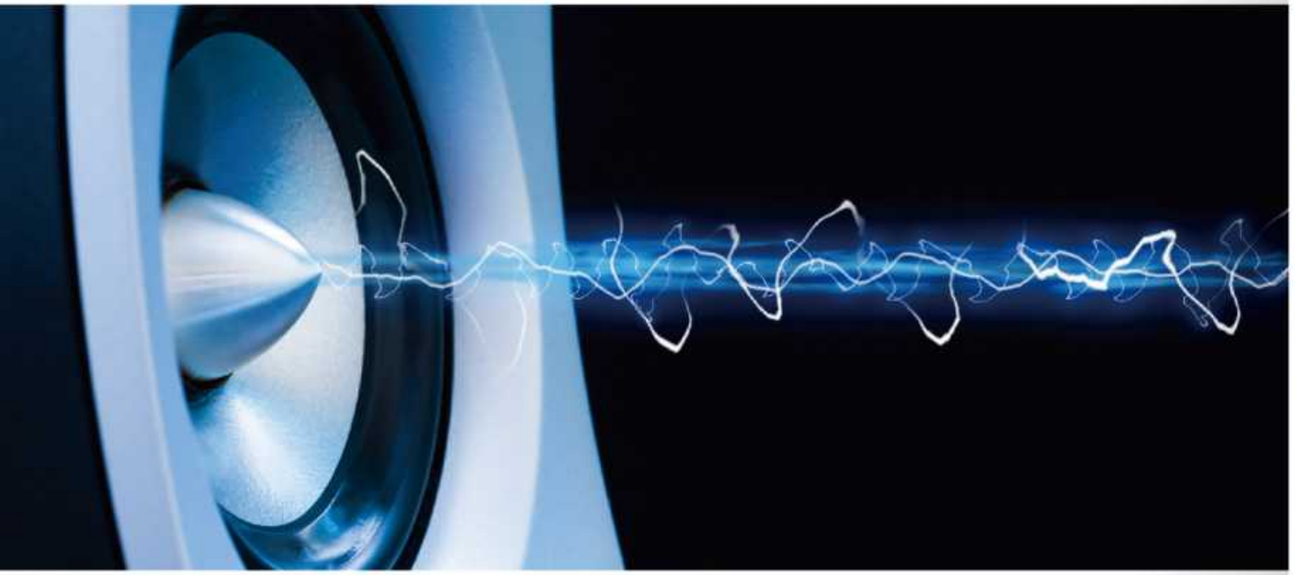
The 26 mm diameter speaker tweeter dome carefully crafted using CVD technology demonstrates its excellent performance advantages. Its separation frequency is as high as 70kHz, which is not only more than twice that of aluminium, but also a significant 40% improvement compared to beryllium. This makes the diamond tweeter dome an ideal choice for creating high-fidelity acoustic devices, which can accurately capture and restore the subtle details of every note, allowing the listener to immerse themselves in a pure, flawless and layered music world.

Performance of Several Tweeter Dome Materials

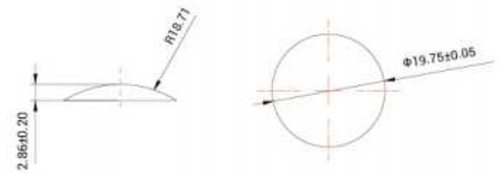
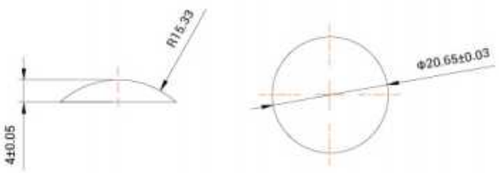
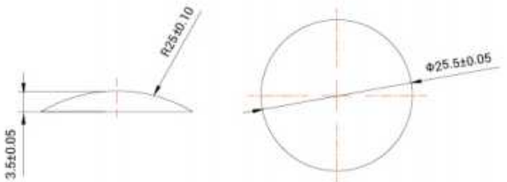
Materials	Sound velocity(km/s)	E/GPa	p/g·cm^{-3}	E/p(10^9m^2/s^2)
Steel	5.1	200	7.9	25.3
Al	5.2	74	2.7	27.4
Ti	6.8	110	4.5	24.4
WC	6.8	720	15.6	46.2
DLC-Ti	6.8	200	4.5	44.4
B_4C	9.6	350	3.8	92.1
3-layer B_4C	9.6	350	3.6	97.2
DF-Al_2O_3	10	460	3.8	121.1
Al_2O_3	10.4	430	3.9	110.3
Be	12.3	280	1.8	155.6
DF	16.5	900	3.3	272.7

Aluminum Dome　　Diamond Dome

To Interpret the High Pitch Beloved by Audiophiles



Product Specifications

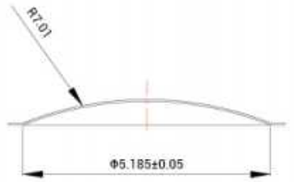
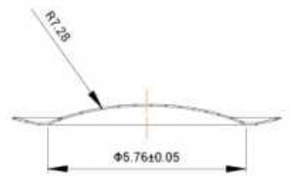
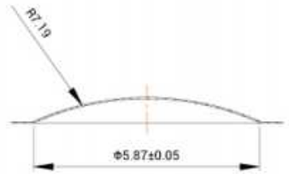
Name	Specifications	Product drawing
Diamond tweeter dome	Φ19.75•2.86•R18.71	
	Φ20.65•4•R15.33	
	Φ25.5•3.5•R25	

Diamond Headphone/Earphone Domes

The diamond dome for earphones is a thin film material processed by Chemical Vapor Deposition (CVD) technology, which is used in the speaker units of earphones.

Diamond headphone/earphone domes occupy an important position in the high-end earphone market with its excellent acoustic performance and durability. With the continuous advancement of technology and the increasing demand for sound quality from consumers, diamond headphone/earphone domes are expected to become one of the important development directions of the future earphone market. Meanwhile, with the continuous improvement of CVD diamond preparation technology and the reduction of costs, its application scope will also be further expanded to more fields.

Product Specifications

Name	Specifications	Product drawing
Diamond headphone/ earphone domes	Φ5.185*0.54*R7.01	
	Φ5.76*0.59*R7.28	
	Φ5.87*0.63*R7.19	

Diamond Stylus

PCD diamond stylus is a high-end accessory for vinyl record players. Its unique performance provide music lovers with a richer music listening experience.

Diamond stylus/pin

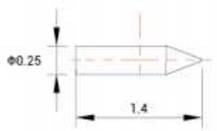
High-end vinyl record player

Vinyl record player

Main Characteristics

1. Precise reading: The PCD diamond stylus has an extremely fine needle tip, which can accurately read the tiny grooves on vinyl records, restoring more delicate and clear sound.
2. Long lifespan: Due to the high wear resistance of PCD material, the service life of Diamond stylus far exceeds that of traditional material made needles, reducing replacement frequency and lowering usage costs.
3. Strong applicability: The PCD diamond stylus produces extremely low friction noise during reading, which helps to improve sound quality and reduce noise interference.

Product Specifications

Diameter (mm)	Length (mm)	Product drawing
0.25	1.4	
0.4	1.4