
GLOSSARY OF TECHNICAL TERMS

This glossary of technical terms contains explanations of certain technical terms used in this Document. As such, these terms and their meanings may not correspond to standard industry meanings or usage of these terms.

“3D printing” or “3DP”	a type of rapid prototyping technology which constructs objects through layer-by-layer printing based on digital model files and by using bondable materials such as powdered metals or plastics
“alloy powder”	various sub-micron and micron-sized alloy powder produced by us
“BC cell”	back-contact cell, a type of PV cell in which both the positive and negative electrodes are arranged on the rear side of the cell, with no metal electrodes on the front side, thereby reducing optical shading losses caused by reflection and blockage of incident light by front-side electrodes
“ceramic dielectric layer”	a component of MLCCs formed by drying and sintering a green sheet prepared by tape casting or other technologies
“chemical vapor deposition” or “CVD”	a chemical engineering technology which mainly involves chemical reactions of one or more gaseous compounds or elemental substances under gaseous conditions to generate solid substances that are deposited on the surface of a substrate, thereby producing powders or films
“condensation”	a process which utilizes the physical property that substances have different saturated vapor pressures at different temperatures, and converts substances in a vapor state into liquid or solid by reducing the system temperature or increasing the system pressure
“conductivity”	the ability of a material to conduct electricity. In the context of silver powder or silver paste, higher conductivity is critical for its effectiveness in PV cells, as it facilitates the efficient transfer of electrical charge
“copper powder”	sub-micron and micron-sized copper powder produced by us
“crystallinity”	the content of crystalline phase in a material, as opposed to the amorphous phase. Generally, the greater the number of crystals and the larger the grain size, the higher the crystallinity
“dispersibility”	the ability of solid particles to disperse into fine particles and remain suspended in water or other homogeneous liquid media without sedimentation or agglomeration
“electrode paste” or “conductive paste”	a mixture of metal powder, glass powder and synthetic resin used for manufacturing the internal electrodes and external electrodes of MLCCs
“electronic components”	the basic constituent parts for constructing electronic systems. Electronic components are constituent parts of electronic elements and small electronic machines and instruments, and may be basic electronic components or assemblies comprising several components, which may be generally used in similar products, including resistors, inductors, transformers, capacitors, diodes, triodes, optoelectronic devices, electroacoustic devices, display devices, thyristors, field-effect transistors, IGBTs, relays, reed switches, commonly used sensors, surface-mounted components and integrated circuits

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“EV”	electric vehicles, vehicles powered entirely or partially by electricity, including battery electric vehicles, plug-in hybrid electric vehicles and fuel cell vehicles
“external electrode” or “terminal electrode”	an electrode which connects the internal electrodes of multiple basic unit capacitors to form a series or parallel connection to enable the function of the device, and is a component of MLCCs
“gas-phase classification technology”	a particle classification technology which uses gas, including dry air or other gases, as the classification medium, and classifies particles of different particle sizes based on the different motion trajectories generated by such particles in gas under external forces such as centrifugal force, inertial force, chemical force and gravity. A typical gas-phase classification technology is the cyclone separation process
“particle size”	the size of particles, granularity or diameter
“Heterojunction” or “HJT”	a high-efficiency PV cell technology (a type of N-type cell) that combines the advantages of crystalline silicon and thin-film silicon structures
“internal electrode”	an electrode layer which, together with the adjacent dielectric layers, forms basic unit capacitors through an alternating and mutually disconnected arrangement, and is a component of MLCCs
“liquid-phase classification technology”	a particle classification technology which uses liquid, including water or other liquids, as the classification medium, and classifies particles of different particle sizes based on the different motion trajectories generated by such particles in a liquid-phase fluid under external forces such as centrifugal force, inertial force, chemical force and gravity. Currently, liquid-phase classification mainly includes two typical technologies, namely centrifugal hydrocyclone classification and gravity sedimentation classification
“low-silver”	a reduction in silver consumption or silver paste usage in PV cells or conductive pastes
“MES”	Manufacturing Execution System, a software system that monitors, tracks and controls manufacturing processes, providing real-time data and insights into production operations to facilitate production control, quality management and decision-making
“micron-size”	particle sizes ranging from 1 μm to 1,000 μm
“ μm ”	micrometer, a unit of length equal to one millionth of a meter
“multi-layer ceramic capacitor” or “MLCC”	a type of capacitor which is manufactured by stacking ceramic dielectric films printed with electrodes, being internal electrodes, in a staggered manner, sintering them at high temperature in a single process to form a ceramic chip, and then sealing metal layers, being external electrodes, at both ends of the chip
“nano-size”	particle sizes ranging from 1 nm to 100 nm
“nm”	nanometer, a unit of length equal to 10^{-9} meter, or one thousandth of a micrometer
“nickel bead(s)”	nickel-based metal consumables used in manufacturing processes such as plating, circuit formation and surface modification

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“nickel ingot(s)”	nickel metal in ingot form, generally used as an upstream raw material for further processing into downstream nickel products such as nickel powder or nickel salts
“nickel precursor paste”	precursor materials used in the preparation of nickel-based conductive paste, including conductive metal powders and related inorganic or organic raw materials
“nickel powder”	nano-sized and sub-micron nickel powder produced by us
“particle size distribution”	the percentage by weight of particles of different particle sizes in powder as reflected by specific instruments and methods. It includes interval distribution and cumulative distribution. Interval distribution represents the percentage by weight of particles within a series of particle size ranges, while cumulative distribution represents the percentage by weight of particles smaller or larger than a certain particle size.
“physical vapor deposition” or “PVD”	a technology which uses physical methods to vaporise a material source, being the surface of a solid or liquid, into gaseous atoms or molecules, or partially ionise it into ions, and deposits a film with certain special functions on the surface of a substrate through a low-pressure gas or plasma process. It generally comprises three basic processes, namely the generation, transportation and deposition of gas-phase substances, and, with technological development, is now applicable to the large-scale preparation of powders
“plasma heating”	the use of electric discharge to heat gas to an extremely high temperature, whereby the heated gas may be used as a controllable heat source for special applications
“atmospheric-pressure plasma evaporation-condensation process”	a proprietary technology over which we own independent intellectual property rights, whereby metal raw materials are heated, melted and evaporated by plasma to generate metal vapor; the metal vapor is transported by nitrogen to a particle controller, where it is cooled, nucleated and grown into ultrafine metal powder; the gas-solid mixture of nitrogen and metal powder is drawn into a filter by an induced draft fan, where the metal powder is collected through filtration, and the nitrogen is cooled by a heat exchanger and recycled
“PV cell”	photovoltaic cell, a non-mechanical device that converts sunlight directly into electricity
“screen printing”	a technique used to apply silver paste onto PV cells to create fine electrical contacts
“silicon alloy powder”	alloy powder composed of silicon and one or more other metallic or non-metallic elements with particle sizes at the nano level produced by us
“silicon powder”	silicon powder with particle sizes at the nano level produced by us
“silver powder”	sub-micron and micron-sized silver powder produced by us
“silver-free”	the replacement of silver-based conductive materials with alternative conductive materials

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“silver-coated copper powder”	composite metal powder with copper powder as the substrate and a silver coating formed on the surface of copper powder particles, with particle sizes at the sub-micron or micron size
“sintering activity”	during sintering, the ability of a powder compact to form particle bonding through heating as a result of the mutual attraction among molecules or atoms in the solid state, and to develop strength through material migration, resulting in densification and recrystallisation. The surface energy of powder materials is greater than the grain boundary energy of polycrystalline sintered bodies, which serves as the driving force of the sintering process. Generally, the smaller the particle size of powder, the greater the surface energy, the lower the initial shrinkage temperature and the higher the sintering activity
“sintering temperature”	the temperature point or range at which, under a specific atmosphere and at a certain heating rate, powder begins to undergo a process involving a reduction in internal surface area, a decrease in porosity, an increase in contact area among particles and an improvement in mechanical strength, during which substances spontaneously fill the inter-particle voids and render the material denser
“specific surface area”	the total surface area of powder per unit mass
“submicron-size”	particle sizes ranging from 100 nm to 1 μm
“tap density”	the density of powder measured after a specified quantity of powder is placed in a tapping container and tapped under prescribed conditions until the volume of the powder no longer decreases
“TOPCon cell”	tunnel oxide passivated contact cell, a type of PV cell that involves depositing an ultra-thin silicon oxide layer and a polycrystalline silicon film on the back of N-type silicon wafers to achieve rear passivation, thereby improving the cell’s open-circuit voltage and overall conversion efficiency
“ultrafine”	particle sizes of 0.5 μm or less