

COMMON USES FOR MICA

SOURCE :

<http://en.wikipedia.org/wiki/Mica>

Metal	Uses
Mica	<p>Ground mica</p> <p>The leading use of dry-ground mica in the US is in joint compound for filling and finishing seams and blemishes in gypsum wallboard (drywall). The mica acts as a filler and extender, provides a smooth consistency, improves the workability of the compound, and provides resistance to cracking. In 2008, joint compound accounted for 54% of dry-ground mica consumption. In the paint industry, ground mica is used as a pigment extender that also facilitates suspension, reduces chalking, prevents shrinking and shearing of the paint film, increases resistance of the paint film to water penetration and weathering, and brightens the tone of colored pigments. Mica also promotes paint adhesion in aqueous and oleoresinous formulations. Consumption of dry-ground mica in paint, the second ranked use, accounted for 22% of the dry-ground mica used in 2008.</p> <p>Ground mica is used in the well-drilling industry as an additive to drilling fluids. The coarsely ground mica flakes help prevent the loss of circulation by sealing porous sections of the drill hole. Well drilling muds accounted for 15% of dry-ground mica use in 2008. The plastics industry used dry-ground mica as an extender and filler, especially in parts for automobiles as lightweight insulation to suppress sound and vibration. Mica is used in plastic automobile fascia and fenders as a reinforcing material, providing improved mechanical properties and increased dimensional stability, stiffness, and strength. Mica-reinforced plastics also have high-heat dimensional stability, reduced warpage, and the best surface properties of any filled plastic composite. In 2008, consumption of dry-ground mica in plastic applications accounted for 2% of the market. The rubber industry used ground mica as an inert filler and mold release compound in the manufacture of molded rubber products, such as tires and roofing. The platy texture acts as an antiblocking, antisticking agent. Rubber mold lubricant accounted for 1.5% of the dry-ground mica used in 2008. As a rubber additive, mica reduces gas permeation and improves resiliency.</p>

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Mica	<p>Dry-ground mica is used in the production of rolled roofing and <u>asphalt shingles</u>, where it serves as a surface coating to prevent sticking of adjacent surfaces. The coating is not absorbed by freshly manufactured roofing because mica's platy structure is unaffected by the acid in asphalt or by weather conditions. Mica is used in decorative coatings on wallpaper, concrete, <u>stucco</u>, and tile surfaces. It also is used as an ingredient in flux coatings on welding rods, in some special greases, and as coatings for core and mold release compounds, facing agents, and mold washes in foundry applications. Dry-ground phlogopite mica is used in automotive brake linings and clutch plates to reduce noise and vibration (<u>asbestos</u> substitute); as sound-absorbing insulation for coatings and <u>polymer</u> systems; in reinforcing additives for polymers to increase strength and stiffness and to improve stability to heat, chemicals, and ultraviolet (UV) radiation; in heat shields and temperature insulation; in industrial coating additive to decrease the permeability of moisture and hydrocarbons; and in polar polymer formulations to increase the strength of epoxies, nylons, and <u>polyesters</u>.</p> <p>Wet-ground mica, which retains the brilliancy of its cleavage faces, is used primarily in pearlescent paints by the automotive industry. Many metallic-looking pigments are composed of a substrate of mica coated with another mineral, usually <u>titanium dioxide</u> (TiO₂). The resultant pigment produces a reflective color depending on the thickness of the coating. These products are used to produce automobile paint, shimmery plastic containers, high quality inks used in advertising and security applications. In the cosmetics industry, its reflective and refractive properties make mica an important ingredient in <u>blushes</u>, <u>eye liner</u>, <u>eye shadow</u>, <u>foundation</u>, hair and body glitter, <u>lipstick</u>, <u>lip gloss</u>, <u>mascara</u>, moisturizing lotions, and nail polish. Some brands of toothpaste include powdered white mica. This acts as a mild abrasive to aid polishing of the tooth surface, and also adds a cosmetically pleasing, glittery shimmer to the paste. Mica is added to latex balloons to provide a colored shiny surface.</p>

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Mica	<p>Mica is also used as an insulator in concrete block, home attics, and can be poured into walls (usually in retrofitting uninsulated open top walls). Mica may also be used as a soil conditioner, especially in potting soil mixes and in gardening plots. Greases used for <u>axles</u> are composed of a compound of fatty oils to which mica, <u>tar</u> or <u>graphite</u> is added to increase the durability of the grease and give it a better surface.</p> <p>Built-up mica</p> <p>Muscovite and phlogopite splittings can be fabricated into various built-up mica products. Produced by mechanized or hand setting of overlapping splittings and alternate layers of binders and splittings, built-up mica is used primarily as an electrical insulation material. Mica insulation is used in high-temperature and fire-resistant power cables in aluminium plants, blast furnaces, critical wiring circuits (for example, defense systems, fire and security alarm systems, and surveillance systems), heaters and boilers, lumber kilns, metal smelters, and tanks and furnace wiring. Specific high-temperature mica-insulated wire and cable is rated to work for up to 15 minutes in molten aluminium, glass, and steel. Major products are bonding materials; flexible, heater, molding, and segment plates; mica paper; and tape.</p> <p>Flexible plate is used in electric motor and generator armatures, field coil insulation, and magnet and <u>commutator</u> commutator core insulation. Mica consumption in flexible plate was about 21 tonnes in 2008 in the US. Heater plate is used where high-temperature insulation is required. Molding plate is sheet mica from which V-rings are cut and stamped for use in insulating the copper segments from the steel shaft ends of a commutator. Molding plate is also fabricated into tubes and rings for insulation in armatures, <u>motor starters</u>, and transformers. Segment plate acts as insulation between the copper commutator segments of direct-current universal motors and generators</p>

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Mica	<p>Built-up mica (continued).</p> <p>Phlogopite built-up mica is preferred because it wears at the same rate as the copper segments. Although muscovite has a greater resistance to wear, it causes uneven ridges that may interfere with the operation of a motor or generator. Consumption of segment plate was about 149 t in 2008 in the US. Some types of built-up mica have the bonded splittings reinforced with cloth, glass, <u>linen</u>, <u>muslin</u>, plastic, silk, or special paper. These products are very flexible and are produced in wide, continuous sheets that are either shipped, rolled, or cut into ribbons or tapes, or trimmed to specified dimensions. Built-up mica products may also be corrugated or reinforced by multiple layering. In 2008, about 351 t of built-up mica was consumed in the US, mostly for molding plates (19%) and segment plates (42%).</p> <p>Sheet mica</p> <p>Sheet mica is used in electrical components, electronics, isinglass, and atomic force microscopy. Other uses include diaphragms for oxygen-breathing equipment, marker dials for navigation compasses, optical filters, pyrometers, thermal regulators, stove and kerosene heater windows, radiation aperture covers for microwave ovens, and micathermic heater elements. Mica is birefringent and is therefore commonly used to make quarter and half wave plates. Specialized applications for sheet mica are found in aerospace components in air-, ground-, and sea-launched missile systems, laser devices, medical electronics and radar systems. Mica is mechanically stable in micrometer-thin sheets which are relatively transparent to radiation (such as alpha particles) while being impervious to most gases. It is therefore used as a window on radiation detectors such as Geiger-Müller tubes.</p>

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Mica	<p>Sheet mica (continued)</p> <p>In 2008, mica splittings represented the largest part of the sheet mica industry in the United States. Consumption of muscovite and phlogopite splittings was about 308 t in 2008. Muscovite splittings from India accounted for essentially all domestic consumption. The remainder was primarily imported from Madagascar.</p> <p>Small squared pieces of sheet mica are also used in the traditional Japanese Kodo ceremony to burn incense. The sheet of mica is placed on top of a cone made of white ash, which contains a burning piece of coal, acting as a separator between the heat source and the incense, in order to spread the fragrance without burning it.</p> <p>Electrical and electronic</p> <p>Sheet mica is used principally in the electronic and electrical industries. Its usefulness in these applications is derived from its unique electrical and thermal insulating properties and its mechanical properties, which allow it to be cut, punched, stamped, and machined to close tolerances. Specifically, mica is unusual in that it is a good electrical insulator at the same time as being a good thermal conductor. The leading use of block mica is as an electrical insulator in electronic equipment. High-quality block mica is processed to line the gauge glasses of high-pressure steam boilers because of its flexibility, transparency, and resistance to heat and chemical attack. Only high-quality muscovite film mica, which is variously called India ruby mica or ruby muscovite mica, is used as a dielectric in <u>capacitors</u>. The highest quality mica film is used to manufacture capacitors for calibration standards. The next lower grade is used in transmitting capacitors. Receiving capacitors use a slightly lower grade of high-quality muscovite.</p>

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Mica	<p>Electrical and electronic (continued)</p> <p>Mica sheets are used to provide structure for heating wire (such as in <u>Kanthal</u> or <u>Nichrome</u>) in <u>heating elements</u> and can withstand up to 900 °C (1,650°F).</p> <p>Isinglass</p> <p>Thin transparent sheets of mica called "isinglass" were used for peepholes in boilers, lanterns, <u>stoves</u>, and <u>kerosene heaters</u> because they were less likely to shatter than glass when exposed to extreme temperature gradients. Such peepholes were also used in "isinglass curtains" in horse-drawn carriages and early 20th century cars.</p> <p>Atomic force microscopy</p> <p>Another use of mica is in the production of ultraflat, thin-film surfaces (e.g. gold surfaces) using mica as substrate. Although the deposited film surface is still rough due to deposition kinetics, the back side of the film at mica-film interface provides ultraflatness, when the film is removed from the substrate. Such ultraflat substrates are common substrates for sample preparation for the <u>atomic force microscopy</u>. Freshly cleaved mica surfaces have been used as clean imaging substrates in <u>atomic force microscopy</u>, enabling for example the imaging of <u>bismuth</u> films, plasma <u>glycoproteins</u>, <u>membrane bilayers</u>, and <u>DNA</u> molecules.</p>