for composite or metal substrates. For nearly 70 years, NUVITE laboratories have been creating appearance maintenance products to meet customer needs and...
ALUMINA: Understanding How the Manufacturing Process Supports Critical Surfacing

Alumina oxide (a.k.a alumina or corundum) is widely used as a raw material in hundreds of applications. Particularly popular in surface finishing operations for materials like metals, sapphire, glass, plastic, and other optical substrates, there are many types of alumina from which to choose. Deciding which – brown, white, fused, calcined, colloidal, fused, etc. – to use for specific materials or surface finishing steps can be confusing. Here’s why it pays to know a little about the manufacturing processes of alumina.

Alumina, derived from aluminum hydroxide, is the main component of the mineral bauxite. While most mined and processed bauxite becomes the metal aluminum, manufacturers recognize the significant demand for alumina chemicals in ceramics, abrasives, sapphire and many other applications. Different manufacturing processes ensure targeted results such as purity, particle shape, reactivity, costs, etc. In turn, we take advantage of the resulting alumina products from these variant manufacturing processes to optimize our own surface finishing operations. The most widely used of these are fused and calcined aluminas.

Produced in electric arc furnaces at temperatures above 2000°C, brown and white aluminas are the most common coming out of the fused manufacturing process. Brown fused alumina is produced from bauxite combined with additives, while white comes from fusing calcined alumina. Because of the high processing temperatures, fused alumina is produced through a process that removes all alpha alumina particles (also known as corundum). Fused alumina products are then gritted, mixed and separated into different particle sizes. Calcined alumina, derived from thermal treatment of aluminum hydroxide (or other aluminum compounds), is typically carried out in rotary or tunnel kilns at temperatures of 800°C to 1500°C. Unlike fused alumina, calcined alumina is processed at lower temperatures allowing controlled transition rates from phases like gamma alumina to fully converted alpha alumina. Controlling the temperature also controls the growth of the crystal size. Calcined alumina is basically agglomerates of crystals, which typically vary from 0.1 to 10 μm. The greater the degree of calcination, the bigger the crystals will be. Similar to fused alumina, calcined alumina is gritted and separated into different particle sizes. Choosing fused, calcined, alpha, gamma or some other type of alumina for each step in the surfacing process is vital. Particles derived from the fused process have very sharp, angular edges, which gener-ally will not break down during polishing. Since they generally deliver higher removal rates than calcined particles, fused particles are often used in grinding and lapping applications (including in fixed and bonded abrasives). The downside? These hard, angular surfaces of fused particles induce more surface damage. This is why calcined alumina, with less angular edges and greater ability to break down into smaller particle sizes, are preferred during the polishing steps of the process.

Both fused and calcined alumina products are available in a variety of particle sizes to optimize each step. In addition to fused and calcined, there are other alumina processes used in surface finishing operations such as colloidal and fumed alumina. These processes produce very small alumina particles with different particle shapes, which typically have applications in final polishing steps.

With all the different alumina choices available, count on the experienced UPI sales and engineering team to help you determine the best alumina size and process for your surface finishing application.

HASTILITE FIN is the latest addition to the HASTILITE line of ultra-high quality, liquid polishing slurries uniquely engineered to produce critical surfaces not attainable by conventional polishing materials. HASTILITE FIN’s enhanced properties deliver higher removal rate in faster processing time to return exceptional surface finish. Its improved suspension formula and REACH/GHS compliance. With parts coated, the entire block is placed in freezer for two hours. The LCL Blue and LCL Black, two new hard coatings with reduced VOCs are the next vital member of the team. With parts coated, the entire block is placed in freezer for two hours. The

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COLD BLOCKING THE Solution to Post Deblock Deformation

The Solution to Post Deblock Deformation

Cold Blocking Technique

For nearly two decades, Optic & Electronic Koch GmbH has built and continues to maintain a stellar reputation as a major supplier of UPI products to the photonics industry in Europe. The association with UPI goes back to the late 1980’s, when Rudi Koch, the company’s founder, was introduced to Aluminum oxide polishing materials by a supplier who was striking out on his own and appreciating the UPI commit-ment to technically advanced critical surfacing materials. Rudi opened his business with UPI products at the core. A family run operation, Optic & Electronic Koch GmbH successfully grew their startup focusing on precision optics and photonics.

Today, with Nils Koch, Rudi’s son and Managing Direc-tor, at the helm, the company commands an impressive share of the optics market in the DACH region of Europe, an area comprised of Germany (D), Austria (A), and Swiss-itzerland (CH). Working in concert with UPI application engineers, the company supplies product and technical support for a wide range of optics, from spherical and plano to nanolithography and IR applications, to name just a few. Optic & Electronic Koch GmbH is positioned for continued growth with opportunities in Scandinavia, Poland and other areas in the EU. While Rudi’s passed the baton, his expertise in the optics field, keeps him a vital member of the team.

RARE EARTH MARKET TRENDS - Keeping a Watchful Eye

The fact that mineable supplies of rare earth elements are heav-ily concentrated in certain geographies and that there is a growing demand for REE from countries across the globe, is reason enough for UNIVERSAL PHOTONICS to continually monitor REE market trends worldwide. We all recall the rare earth crisis a few years ago, when in a matter of weeks, prices increased by more than an order of magnitude and availability became at best uncertain. Cerium oxide, one of the rare earths used extensively in polishing applications by a broad base of our customers, was threatened by supply outages. Depending on our extensive Asian network, UPI was able to provide real-time updates and information on pricing and availability of raw materials to lessen the impact on production. Today, China produces more than 85% of the global supply and is the largest consumer of REE. Since 2013, China has taken steps to secure its REE market stockpile, instilling more reserves than other countries, with levels approximately 30x greater than the USA. Furthermore, consolidating authorized suppliers into six large companies helps China stabilize price, manage reserves, and forecast its future needs, predicted to increase in their pursuit of clean energy. While pricing and supply for 99.9% min. cerium oxide have remained stable, we’re seeing a measurable uptick in raw ma-terial prices climbing to 15,300 KBO per metric ton in October, a 40% increase over January 2017. This does not reflect price increases for the final product, since there are many processing steps required to bring raw cerium oxide to the final state used in polishing. We expect a small increase in the sell price of lower priced cerium, which requires less processing making the raw material a larger percentage of the final cost, and likely to no increase in the higher polishes. Availability does not appear to be a concern at this time. We do not know if this is an indication of things to come or just a short term bubble, but UPI will continue to monitor the situation and keep you posted should there be any significant movement.

COLD BLOCKING - The Solution to Post DeBlock Deformation

For more information visit www.universal-photonics.com.