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# POINT OF VIEW THE POWER OF ELUTRIATION

While elutriation may not be a household word, its applications are many. Elutriation is basically the technology of the separation of "finer lighter particles from coarser heavier particles" as Webster puts it for the layman. A better definition is given by Ron Abramshe, Plant Manager for Warran/Amplex Superabrasives, as "...the process of grading micron and submicron sizes into equal distributions that are normally distributed," or to sum it up, coarse particle management.

Elutriation applications range from slicing and dicing of semiconductor wafers, polishing mirrors, polishing of medical devices, producing GMR-read/write heads for hard drives, and separating protein, virus and bacteria, and even mining of iron ore (magnetic elutriation).

Better known in the industry by its broader term, micronization, the total technology involves sedimentation, elutriation and centrifugation. The use of these technologies has a direct link with contamination control in such industries as microelectronics, medical device manufacturing, and biotechnology manufacturing. The process can control the defect rate in microelectronic applications, as well as tightness of distributions for medical applications where final polish of instruments and prosthesis are critical.

The metrology is as important as the separation. Measuring what particle distribution you end up with is critical. "Using optical methods of measurement you end up seeing agglomerate; agglomerates are particles that for a lack of a better term are stuck together," says Abramshe. He points out that in sticking together, it becomes difficult to see the individual pieces because as they stick, they gain size and create a depth-of-field focusing problem for optical or scanning electron microscopy.

Since, electrozone particle analyzers use a conductive fluid bath (saline for instance), an orifice in the bath, and an anode, they circumvent this problem, explains Abramshe. As particles are placed in the batch and drawn through the orifice, there is a certain volume that is displaced by the non-conductive particles (be they diamond, aluminum oxide, blood cells, etc.). This volume displacement is measured by the difference in electrical potential of the fluid preceding the particle and after. The change in electrical potential is directly due to the volume displaced then calculated to a particle size.

If you do a Web search, you will find that there is a large quantity of work done with elutriation in Europe. Abramshe explains that this is because elutriation technology started commercially in England in 1953.

What's ahead for elutriation? Abramshe points out that the near term challenge for particle management is to continue to do gage studies on particle size measurement devices to ensure their accuracy. Further challenges will occur with nanotechnology and measuring nano-particles accurately.

Ron Abramshe is Plant Manager at Warren/Amplex Superabrasives, 1401 East Lackawanna Street, Mid-Valley Industrial Park, Olyphant, PA 18447;800-368-5155 or ron.a.abramshe@saint-gobain.com. A2C2 will publish an article on Coarse Particle Management by Ron Abramshe in an upcoming issue.