



Ebatco Nano

A Bimonthly Newsletter

Vol. 9 | Issue 04
Jul./Aug. 2019

Nano Brief

Ebatco Academy's second training course is coming in a couple of weeks!

If this is your first time hearing about it, the course is titled "Contamination, Impurity, and Unknown Material Identification" and will be held on September 19th-20th. It will cover how to identify unknown materials, contaminations, and impurities using FTIR, Raman, SEM/EDS, and XRD techniques. There are still a few seats available so please make sure to register as soon as possible to secure your place in this event. Please take a look at the attached brochure for further information.

Ebatco will be exhibiting at these upcoming events:

- September 29th – October 2nd, Printing for Fabrication 2019, Parc 55, San Francisco, CA, representing Kyowa Interface Science Co., Ltd.
- September 29th – October 3rd, MS&T19, Booth # 530, Oregon Convention Center, Portland, OR
- September 30th, AVS MN Chapter Annual Symposium, University of Minnesota, St. Paul, MN
- October 23rd – October 24th, MD&M 2019, Booth #1040, Minneapolis Convention Center, Minneapolis, MN
- November 10th – 14th, ISTFA 2019, Booth #806, Oregon Convention Center, Portland, OR
- December 1st – 6th, Materials Research Society Fall Meeting & Exhibit, Hynes Convention Center, Boston, MA

Please stop by our booth to discuss the incredible world of surface sciences, nanotechnologies, nanomaterials, and nano/micro scale material and device characterization with our staff scientists. We hope to see you there!

Ebatco

With growing customer base and demand, addition of new talents is warranted. To better serve our customer's needs, a new Technical Sales Engineer, Dietrich von Diemar, has just been hired on. Please join us in welcoming him on board.

Dietrich has a Master's degree in Physics from the University of Dortmund and a B. S. degree in Physics from the University of Bonn. Following his graduation, Dietrich worked as an International Sales Manager for SPECS GmbH and SPECS USA, Inc. selling and marketing surface analysis instruments. For several years after, Dietrich was President and Chief Operating Officer for SPECS Scientific Instruments, Inc., a Florida-based international corporation for scientific and analytical instrumentation.

As a customer relationship representative of Ebatco, Dietrich is looking forward to providing the best possible support to existing and prospective customers, and strive to serve as a bridge between Ebatco's analytical expertise and customer's needs.

Case Study

Particle Size Analysis using Raman and AFM

The presence of unwanted particles is almost unavoidable in many situations, and unfortunately these particles can negatively affect the performance of products. Often associated with failures of medical devices, poor sterilization procedures, and contamination in general, particles have a way of working their way into even the highest class of cleanrooms. As a result, particle analysis has become widely applicable (especially in failure analysis projects), and many instruments have been developed to help analysts characterize these often submicron-sized issues.

Complete particle characterization is paramount to any particle analysis project. This typically includes chemical, size, and morphological characterization. While particle size (or hydrodynamic radius) is traditionally measured using dynamic light scattering (DLS) or particle counting instruments, these techniques give no additional information regarding the chemistry and structure of the particles. Confocal Raman Microscopy (CRM) and Atomic Force Microscopy (AFM), however, are particularly well-suited to provide the chemical and structural information, in addition to provide information on the particle size and shape. In this application note, a mixture of particles was analyzed via Raman microscopy to investigate their chemical structure. Additionally, diamond crystals were analyzed by AFM to investigate particle morphology and shape.

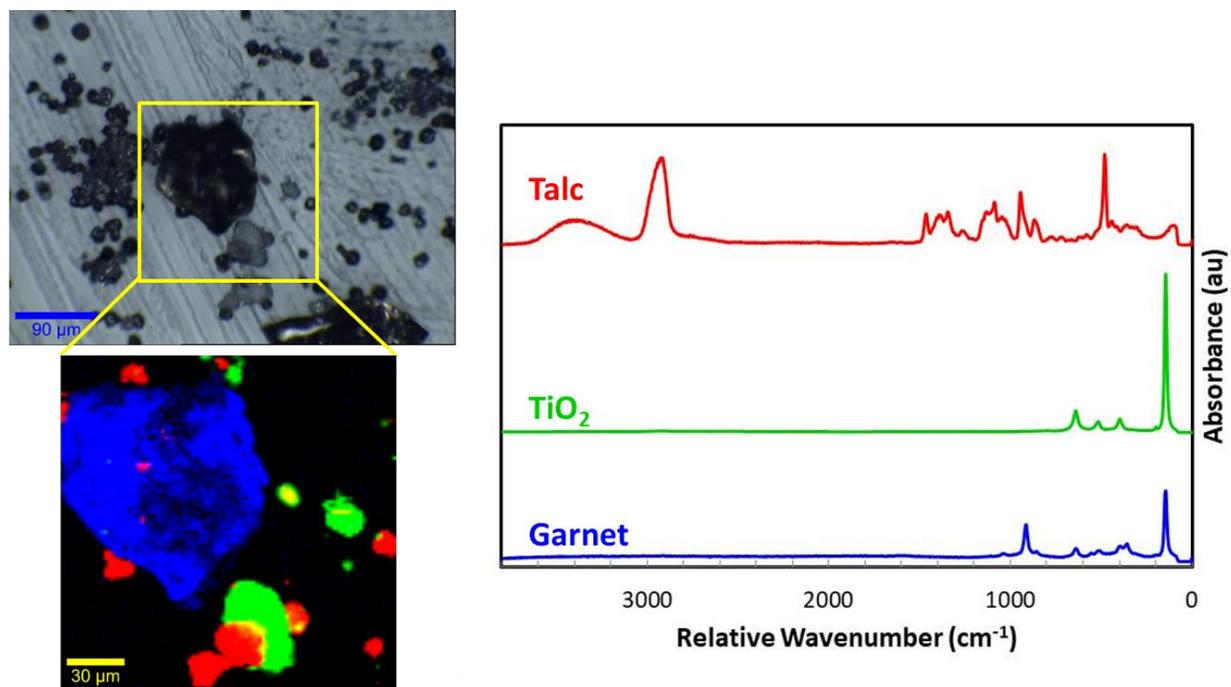


Figure 1. Raman image (left) of a mixture of garnet (blue), talc powder (red), and TiO₂ (green) and the associated Raman spectra (right).

For the Raman investigation, a mixture of particles was created using talc powder, TiO₂, and garnet crystals. The particles were shaken together, deposited on a standard glass coverslip, and analyzed using the Raman microscope. The results are shown in Figure 1. As can be seen from Figure 1, the garnet particles are somewhat larger (115 μm) than the smaller TiO₂ (10 – 50 μm) and talc (10 – 20 μm) particles. The corresponding spectra to each particle are shown to the right of the Raman image. Raman microscopy is easily able to distinguish the differing chemistry of each particle, and this comprehensive particle characterization can be obtained in a manner of minutes.

Separately, some diamond polishing crystals were deposited on a glass microscope slide for AFM characterization. As the particles could be mobilized by contact mode AFM, non-contact mode was chosen for analysis, and the resulting topographical images are shown in Figure 2. Large diamond particles approximately 2 μm in size, medium particles 400 nm in size, and small particles 170 nm in size were all observed. All particles exhibited a lobed-type fine structure; for the 170 nm sized particles, the lobes were 50 – 80 nm

in size and appeared evenly distributed around the center of the particles.

Raman characterization reveals powerful insights regarding the chemical constituency of particles and size of particles. When combined with the morphological information obtained from AFM analysis, the two techniques are well-suited to provide comprehensive data in particle analysis. Particles of almost any size, shape, and constituency can be analyzed, significantly widening the breadth of applications of these techniques to almost any industry.

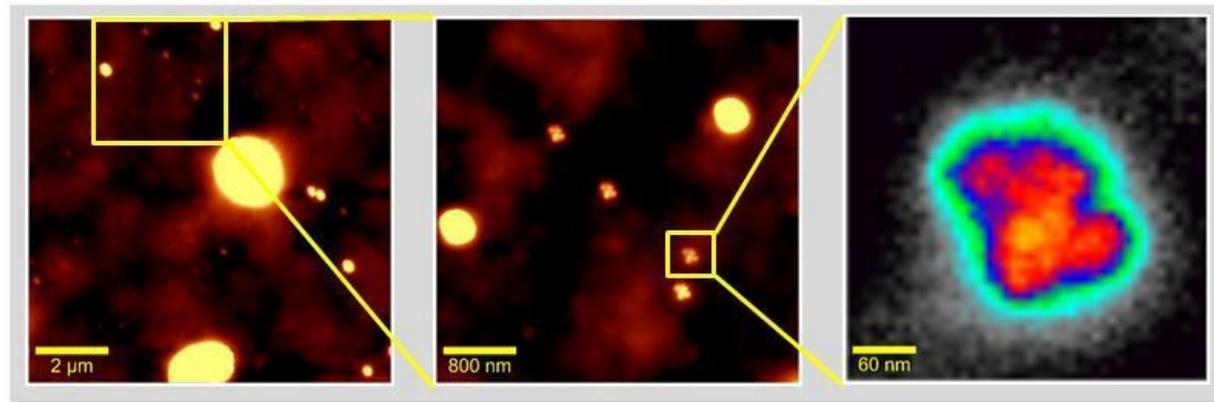


Figure 2. AFM images of diamond crystals on a glass slide. Small-lobed fine structures (50-80 nm in size) were observed on the surface of the crystals.

To subscribe or unsubscribe to this newsletter, contact info@ebatco.com.

Ebatco, 10025 Valley View Road, Suite 150, Eden Prairie, MN 55344
+1 952 746 8086 | info@ebatco.com | www.ebatco.com