



Ebatco Nano

A Bimonthly Newsletter

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Nano Brief

In the upcoming months, we will have an exhibition booth at two local society meetings. The first exhibition runs in conjunction with the Minnesota Chapter AVS Short Course Offering at the Continuing Education and Conference Center at the University of Minnesota. The second is the MMS Spring Symposium at the Science Museum of Minnesota. As always, please stop by our booth to discuss the fantastic nano world of nanomaterials, nanodevices and nano/micro scale surface characterization with our staff scientists.

- April 11th, Minnesota Chapter American Vacuum Society Short Courses and Exhibition, St. Paul, MN
- May 4th, Minnesota Microscopy Society Spring Symposium, St. Paul, MN

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Previously in the November and December 2011 issues, we highlighted two companies we represent specializing in nanotechnologies and surface analytical instrumentation. Another such company we represent in the US Midwestern region is CRAIC Technologies. CRAIC Technologies is a world-leader in the manufacturing of microspectrophotometers, UV-Vis-NIR microscopes, and Raman microspectrometers.

The 20/20 PVTM is the culmination of the latest advances in optical, spectroscopy and software technologies to present the most powerful microspectrophotometer from CRAIC Technologies to date. The 20/20 PVTM allows the user to measure absorbance, emission, fluorescence, reflectance and transmission in the UV-Vis-NIR range of sample sizes less than one micron in width. In addition, the 20/20 PVTM can determine thin film thickness and color spaces.

CRAIC Technologies also offers a line of microscope spectrophotometers that can attach to existing optical microscopes. The 308 PVTM and the CRAIC ApolloTM Raman spectrometers can be attached to a microscope photoport by means of an adapter. The 308 PVTM expands the optical viewing capabilities of an ordinary microscope to include spectroscopy, color imaging and even film thickness measurement. The CRAIC ApolloTM Raman spectrometer is capable of capturing Raman spectra quickly and easily.

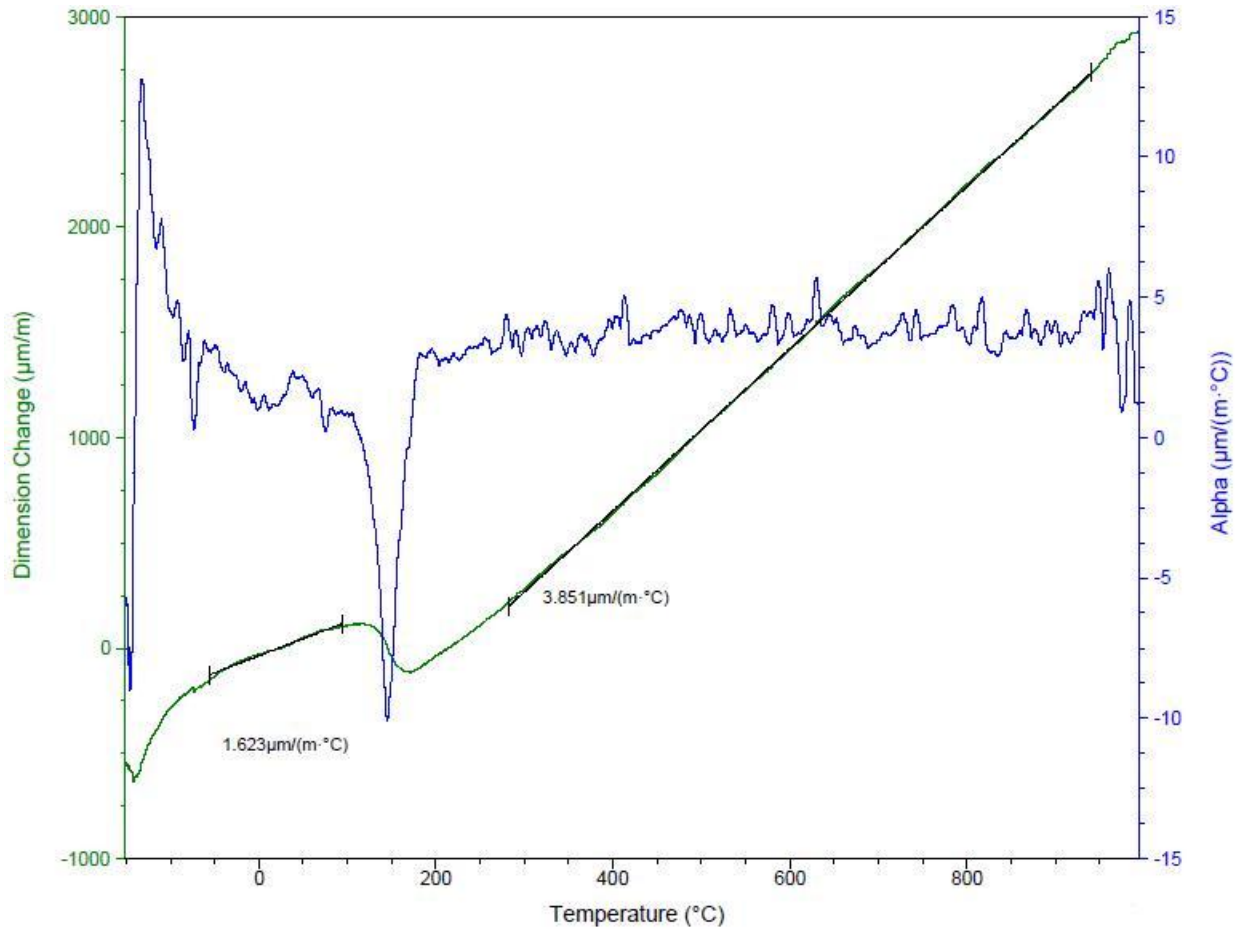
CRAIC Technologies manufactures high quality microscopes as well as spectrometers. The UVM-1TM is an ultraviolet microscope that

can image microscopic samples in the UV-Vis-NIR range. The UVM-1 incorporates advanced optics to capture best image quality in the UV-Vis-NIR range. All instruments designed by CRAIC Technologies, combine durability, ease of use, performance and aesthetics that work in industrial settings just as well in a laboratory.

Case Study

In most cases, a material expands when heat is applied. The rate at which the material changes dimensionally is the coefficient of thermal expansion. Understanding the rate at which a material increases in size can be critical for applications where significant temperature ranges are experienced, such as engine components and supersonic aircraft wings. One method to measure the dimension change of a material in relation to changes in temperature is through Thermomechanical Analysis (TMA).

As an example, a silicon nitride cylinder was analyzed with a TA Instruments (USA) Q400 Thermomechanical Analyzer from -150°C to 1000°C using an expansion probe. The results show two different coefficients of linear expansion separated by a segment of contraction. Variations in the coefficient of linear expansion in some materials can be caused by stress in the material. Reanalyzing a material over the same temperature range may yield the coefficient of thermal expansion without the influence of stress. However, in our example a similar phenomenon was repeated during the second run. This proves the results are genuine and makes the material a candidate for further testing through modulated thermomechanical analysis.



TMA results for the thermal expansion of silicon nitride.

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