

# PHI Analytical Systems Are Valuable Tools in Regular use at the 3M Corporate Research Analytical Laboratory

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Staff Scientist, Gary Korba, next to his PHI “VersaProbe” at 3M in St. Paul.

**Thousands of Products Utilizing Thin Film Technologies  
3M Corporate Research Analytical Laboratory (St. Paul, Minnesota, U.S.A.)  
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Research Analytical Laboratory**

The 3M Company has come a long way since its humble beginnings as the Minnesota Mining and Manufacturing Company. Today 3M is a huge multinational conglomerate with over 76,000 employees. Among the more than 55,000 products it makes are lines of adhesives, abrasives, laminates, passive fire protection solutions, dental products, electrical materials, electronic circuits and optical films.

The 3M network spans the globe with operations in more than 60 countries. That number includes 29 international subsidiaries with manufacturing operations and 35 with R&D laboratories. Its products are sold via distributors and retailers in more than 200 countries as well as through 3M’s online store.

PHI analytical systems including the “VersaProbe” are currently being used in the 3M Corporate Research Analytical Laboratory in St. Paul, Minnesota. These PHI systems play an important role in developing 3M’s new, innovative products. Chris VonRuden, PHI salesman for the Midwestern United States, interviewed 3M Staff Scientist and PHI customer, Mr. Gary Korba, about his experiences with PHI systems and working with PHI.

**3M Serves Many, Many Markets Worldwide**

Chris: Can you give a brief overview of the markets/products 3M is involved in?

Gary Korba: In general terms 3M is a manufacturer working in a broad variety of markets and categories. We make about 50,000 to 60,000 different products right now. They cover everything from medical products, and dental restoratives, to abrasive products and tape. Some of our more famous brands include Post-it Notes, Scotchbrite Scotch Brand Tapes and the Vikuiti family of Optical Films.

Chris: What are some unique 3M products that make it stand out from its competitors?

Gary: The thing that makes our products so special to our customers is the fact that we can combine components from over 40 technology platforms into a wide variety of new products and technologies to meet the needs of our customers. I think probably one of the more interesting examples of this is the development of our Brightness Enhancement Films that combined our expertise in Polymer Science, Microreplication and Display technologies to give our customers a product that allows them to get nearly twice the light out of LCD's. These films are used on large screen televisions, laptop and computer monitors as well as many other backlit LCD or LED style display screens. We also use them on touch screens and 3D displays as well.

Chris: What direction do you expect 3M will take its product lines in the future?

Gary: We are probably going in just about every direction you could think of because we are a major supplier to many industries, including the health care, automotive, and energy control and renewal energy industries. Certainly renewable energy is one of the areas where we see a large opportunity for growth in the future. We are seriously committed to working in that market space and I think we will see even more products develop in the near and long term for solar energy, energy conservation, etc.

### **PHI VersaProbe Plays a Big Role in Analyzing Multi-layer Polymeric Materials at 3M**

Chris: You're currently using the "PHI 670" Scanning Auger Nanoprobe, the "ADEPT 10-10" Quadrupole Dynamic Secondary Ion Mass Spectrometer, and the "VersaProbe" Scanning X-ray Microprobe, whose C<sub>60</sub> sputter ion gun plays a big role in your work. What type of applications are you using this equipment for?

Gary: We utilize the PHI "VersaProbe" here in a lot of ways but the major applications involve the analysis of our product lines that often consist of multiple layers of thin organic materials such as adhesives, reflective materials, energy control films and optical films. That's where the Depth-Profiling capabilities of the PHI VersaProbe have played an essential role in the development of our new Products by gaining a far better understanding of the Thin Film Technologies behind those products.

### **Highly Reliable and Valuable Surface Analysis Instrumentation**

Chris: What are the advantages of working with PHI?

Gary: I think there are a lot of advantages including the close proximity of PHI to our Laboratory here in St. Paul Minnesota. We always get a fast response and have been very impressed by the speed as well as the quality of the service and consultation we have gotten whenever we've had a problem.

When we took delivery of our new "VersaProbe" we were extremely pleased to find that it met or exceeded all specifications immediately even though we knew it was early after its initial introduction to the surface analysis instrumentation marketplace. The overall reliability of the system has been very, very good as well over the past two years. We utilize these instruments probably on the order of 20 hours a day, almost 7 days a week. I just finished a

series of acquisitions on some very complex samples that took about 50 continuous hours of analytical data gathering. I think the other thing that is inherent in the instrument, which I have been very impressed and very pleased with for the most part, is the stage and sample manipulation. For an XPS system, the accuracy, positioning, and repositioning accuracy of the Auger stage on this system is really superb. When you start to do depth profiling, where alignment of many beams is critical, you have to have a stage that is that good if you want to work in an automated mode. Those are the little things that you may never really consider when you are buying a system but if you get it and those things don't work right, they can be real irritants. It has been just the opposite with the "VersaProbe".

Chris: I'm glad to hear that. What are the drawbacks to working with a company like PHI?

Gary: I have to say that we really don't have at this point in time. We realized that there would be several updates and modifications as this system was refined and developed and we have had a lot of help and feedback from the people at PHI as they have learned new ways of adjusting, maintaining, or upgrading things. I don't have a single complaint that I can think of.

### **Automated Complex Depth Profiling Saves Time and Yields Better Data**

Chris: Since you work so much with the "VersaProbe", are there any improvements or changes you would like to see in future models or versions?

Gary: The one recommendation we had was to add an ionization gauge on the prep chamber as a standard feature. That is pretty minimal in terms of changes but I think that it has been really handy for us to put one on there. It would be nice to have that integrated into the software and the interlocks. We have to pump down many samples that tend to outgas and this would allow us better control over the sample insertion process. I think the sample handling is very versatile. We can mount a lot of odd-shaped materials. We also have the hot/cold stage now and that has worked well for everything we have tried so far, which has mainly been cold stage work. Considering the complexity of the system, I think the software is extremely intuitive and user friendly for a surface analysis instrument. One of the things that I find a big plus in the recent software releases is the ability to sputter with argon, C<sub>60</sub> or combinations of the two. We have actually been able to accomplish very accurate quantitative depth profiles of materials that are mixtures of inorganic and organic materials, using that feature. I think that having the versatility of both guns on the same system allows you to automate complex depth-profiling procedures saving us a lot of time per analysis.

Chris: Sure, it gives you more of an automated profile.

Gary: Yes, and a much more diagnostic profile at the same time.

Chris: Thank you for taking time out of your schedule to talk with me today. You are a valued PHI customer and we are very happy to be working with you.