

Case Study

Allied BioScience uses Bruker TRACER 5i spectrometers as part of their proprietary and patent pending methodology to monitor the efficacy of their antimicrobial coatings which reduce the presence of surface germs.

Monitoring the efficacy of antimicrobial coatings

Allied BioScience develops innovative solutions to create cleaner human environments. They specialize in revolutionary, always-on antimicrobial coatings that provide continuous and long-lasting surface protection across public spaces. Their specialized coatings are used in a variety of industries, including healthcare, cleaning & sanitation, government & military, sports & fitness, as well as mobile housing & facilities.

According to Allied BioScience: "Research shows that germs in public spaces are a constant presence—invisible and unnoticed, but often at the root of infection and illness. As facilities are used, surfaces are exposed to accidental cross-contamination and constant recontamination."

Dr. Parham Asgari, Research Scientist at Allied BioScience, along with his colleagues, Dr. Jie Fang *et al.*, use X-ray fluorescence (XRF) methods to ensure anti-microbial coatings are properly applied to a given substrate and to monitor wearing-off of coatings already applied. Dr. Asgari stated: "With the rapidly developing global concern about Covid-19 transmission, hospitals need to be as vigilant as possible to minimize exposure to these highly contagious germs. We have purchased additional handheld XRF's to increase our efforts in monitoring the presence and efficacy of our anti-microbial coatings during this very critical time."

The non-destructive XRF technology of the TRACER 5i enables reliable identification of elements present in solids, powders or liquid samples, and precise determination of their amounts with appropriate calibrations. The nose of the analyzer can be touched directly to a solid surface for immediate results to act on.

How do Bruker's TRACER 5i's help Allied BioScience?

Allied BioScience began using Bruker's Handheld XRF in 2018 to develop methods and presented their findings to predict the efficacy of an antimicrobial surface coating utilizing X-ray Fluorescence Spectroscopy at IDWeek 2019. This is the joint annual meeting of the Infectious Diseases Society of America (ISA), Society for Healthcare Epidemiology of America (SHEA), the HIV Medical Association (HIVMA), the Pediatric Infectious Diseases Society (PIDS), and the Society of Infectious Diseases Pharmacists (SIDP).

Allied BioScience's presentation illustrated the high value of using Bruker's handheld XRF technology as part of their proprietary and patent pending rapid and cost-effective method to enable validation of their invisible antimicrobial polymer coating's activity at any time point.



TRACER 5i battery operated handheld XRF spectrometers

Handheld XRF



The handheld XRF methodology is proprietary to Allied BioScience, Inc. and the subject of their pending patent application for a rapid and cost-effective method to validate invisible antimicrobial polymer coating activity at any time point.

Coatings with micro-scale thickness and transparency

Contaminated surfaces are a critical risk factor for transmitting infectious disease. Current disinfection products provide short-term antimicrobial action; however, these surfaces can be recontaminated within hours after cleaning. To address this limitation, long-lasting antimicrobial polymer coatings have been developed as an adjunct to traditional disinfecting and cleaning protocols. Due to the micro scale thickness and transparency of the coating, confirmation of its presence on surfaces is difficult with conventional methods.

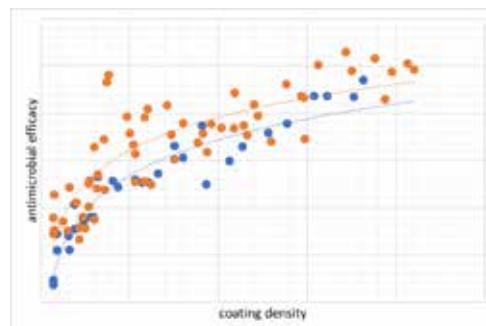


The TRACER 5i is a battery operated handheld XRF for in-situ testing or for small sample testing using a portable desktop stand. Measurement conditions can be controlled on the screen or via remote PC.

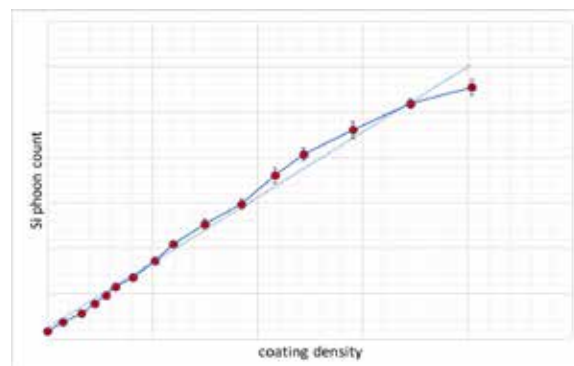
Allied BioScience utilized TRACER 5i Handheld XRF spectrometers in their novel approach to measure durable polymer coatings on multiple surfaces to validate their presence and their relative antimicrobial activity. The methodology is proprietary to Allied BioScience, Inc. and the subject of their pending patent application.

TRACER 5i handheld XRF results for invisible polymer coating measurements

Coated stainless steel surfaces were analyzed for their XRF profile using the TRACER 5i handheld XRF. Additionally, the relationship between the XRF spectra and antimicrobial activity was evaluated using a modified version of an existing sanitization protocol for hard surfaces using *Staphylococcus epidermidis* as the test organism.



Comparison of the amount of antimicrobial polymer coating (in mg) and the XRF values (photon count) revealed a calibration curve with a high degree of linearity ($R^2 = 0.993$) especially for surfaces that had lower coating mass. In addition, the relationship between XRF values and antimicrobial efficacy also were found to be well-correlated with a logarithmic trend ($R^2 = 0.9308$).



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