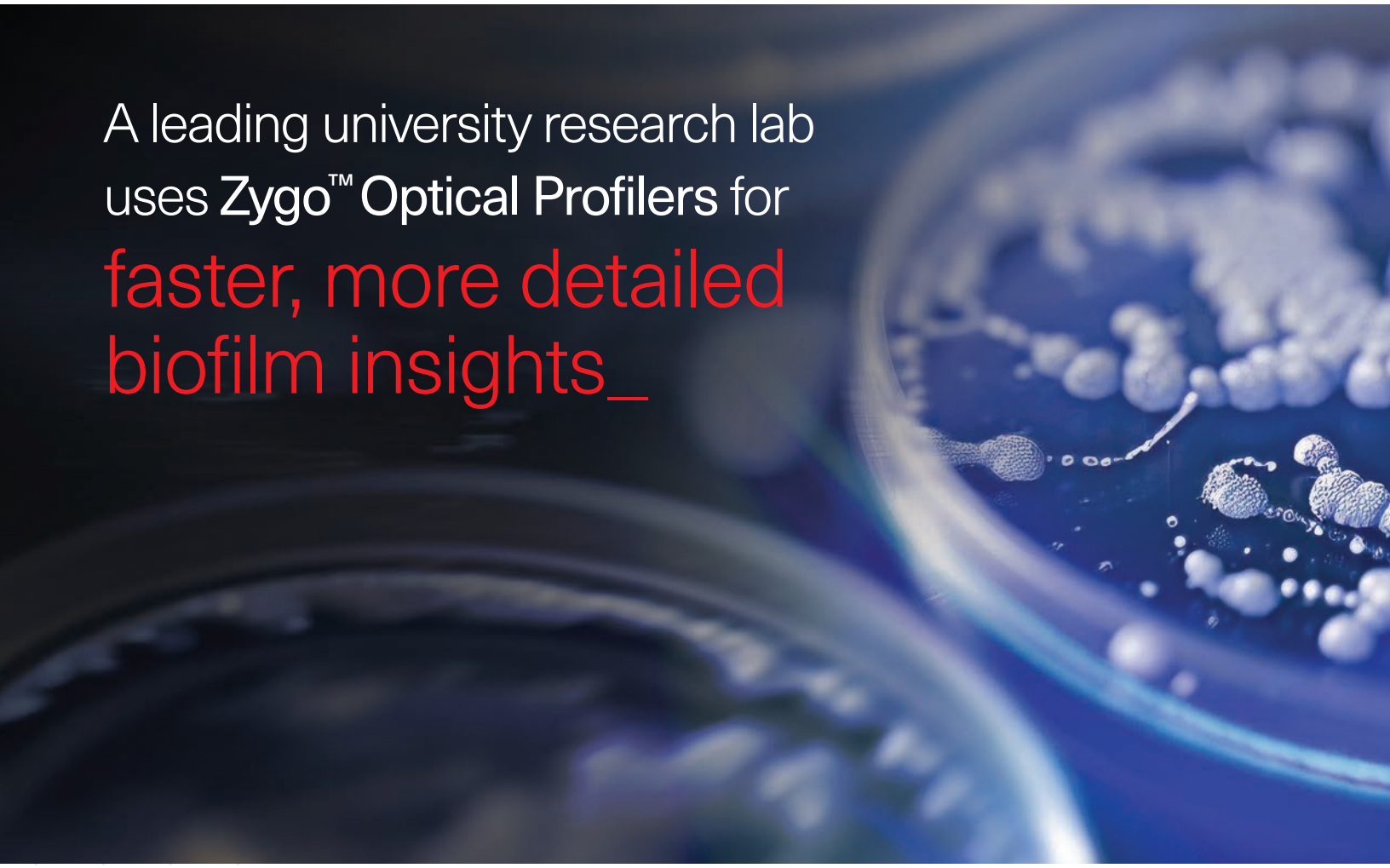
A leading university research lab uses Zygo™ Optical Profilers for faster, more detailed biofilm insights_

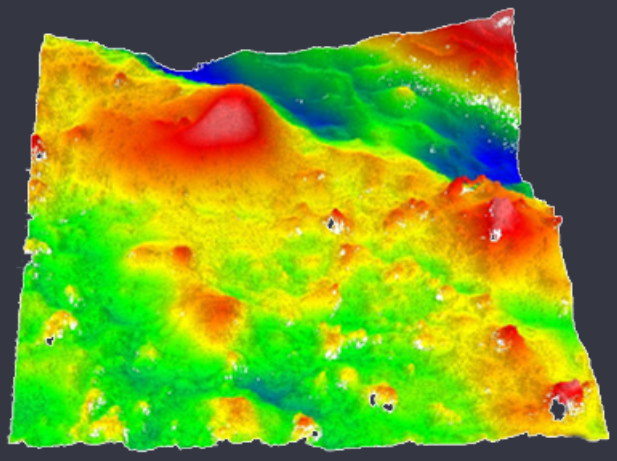


Situation_

The team at a leading university research lab studies bacterial biofilms for insights into their behavior and growth processes. Accurate biofilm measurement is essential for the lab's work. However, the complexity and variability of biofilms pose unique challenges for conventional imaging tools.

The team at the lab was using an optical profiling instrument that enabled high-resolution, three-dimensional imaging of biofilm structures. Labor-intensive sample preparation combined with time-consuming imaging and computationally intensive data processing were leading to long acquisition times. These limitations hindered timely and reproducible biofilm characterization, critical for the labs ongoing studies. At the same time, researchers were looking for higher resolution imaging to better study the fine structure of the biofilms. And because biofilms are dynamic systems, there was great interest in imaging techniques that could provide time-lapse images of bacteria during the initial growth and division phase. The team also explored profiling dynamic biofilm development, targeting specific bacterial strains like Pseudomonas aeruginosa and Staphylococcus epidermidis, known for their medical relevance in antibiotic resistance.

Coherence scanning interferometry for biofilms produces images with larger field of view and lower measurement noise in real-time.

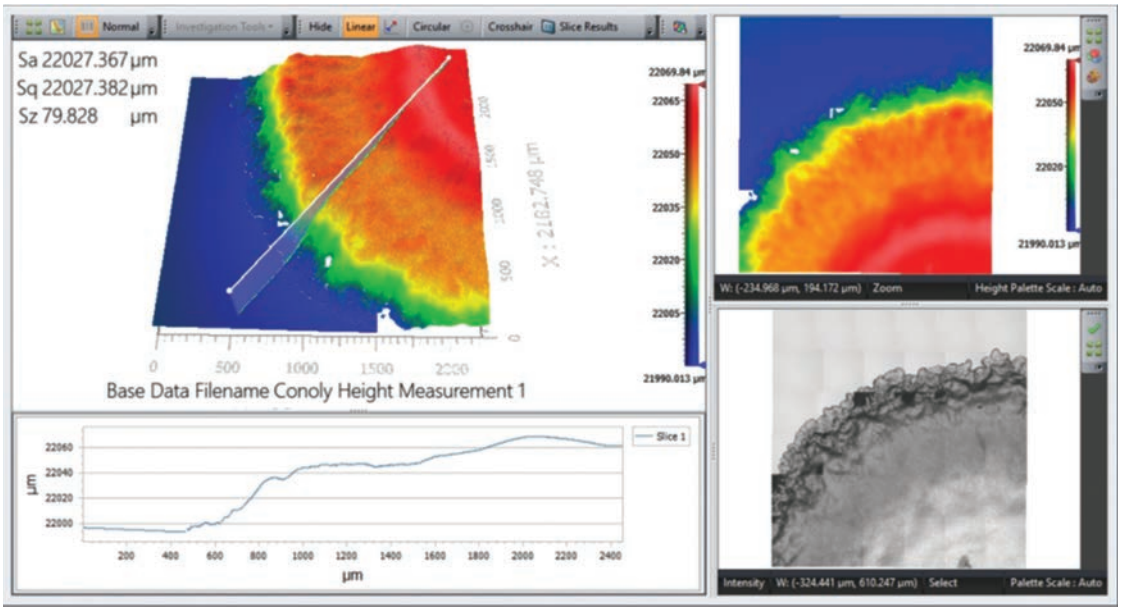


Solution_

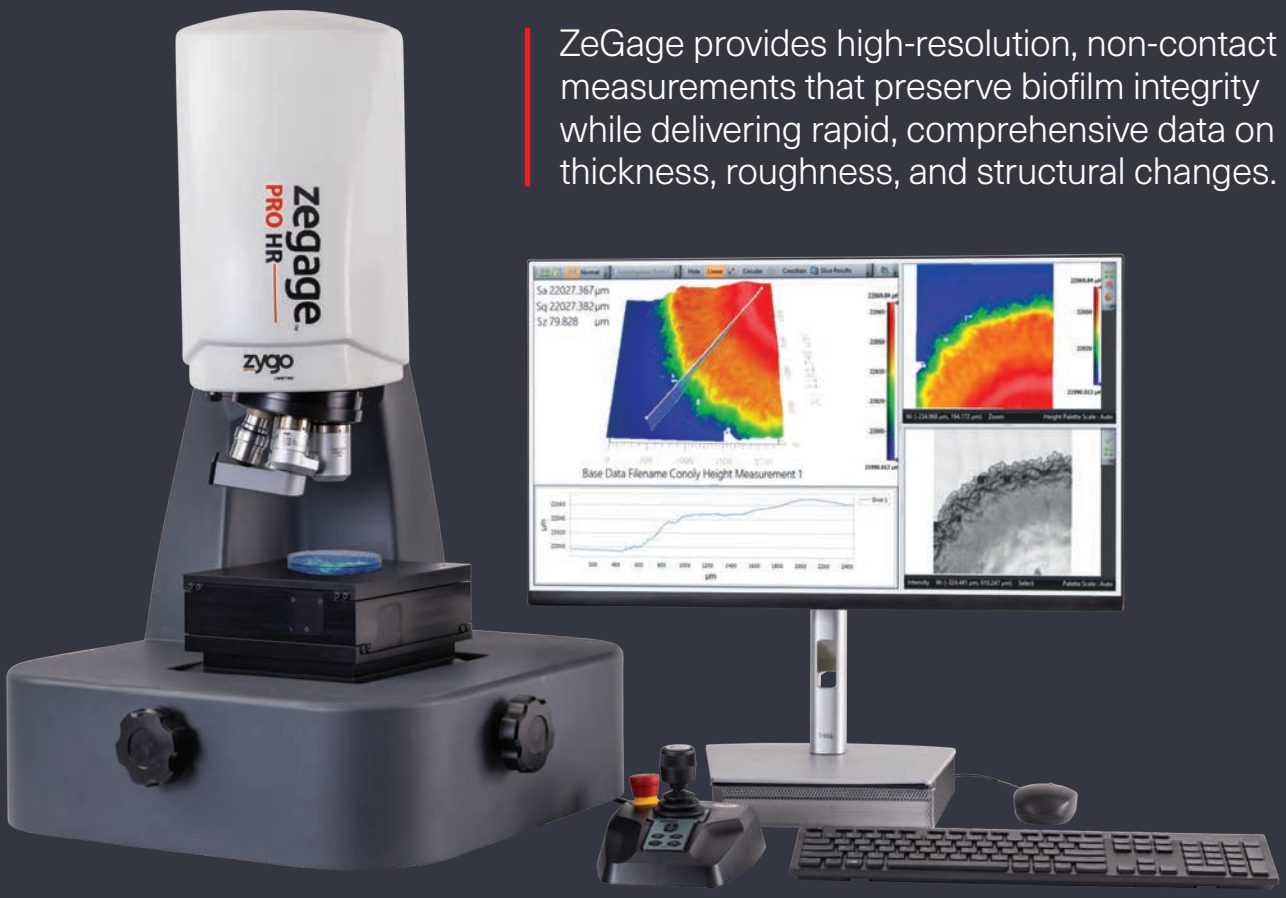
With their goals in mind, the team set out to find a microscopy solution that could simplify and speed data capture and analysis while providing higher resolution images and real-time measurements.

The university lab discovered Zygo's coherence scanning interferometry (CSI) capabilities as detailed in the research 'Vertical growth dynamics of biofilms' (PNAS, 2022), where the ZeGage Optical Profiler was used to provide measurements with sub-nanometer surface topography noise.

They found that the ZeGage Optical Profiler is a breakthrough CSI solution that provides high-resolution, non-contact measurements that preserve biofilm integrity while delivering rapid, comprehensive data on thickness, roughness, and structural changes. It enables non-destructive imaging that can provide high-resolution 3D topographic images of biofilms without damaging or disturbing the sample.



ZeGage provides high-resolution, non-contact measurements that preserve biofilm integrity while delivering rapid, comprehensive data on thickness, roughness, and structural changes.



Combined with the ability to take measurements at different time intervals, this would allow researchers to study biofilms in their natural state and observe changes over time.

The ZeGage Optical Profiler employs low-coherence interference patterns to measure surface profiles with nanometer precision, making it ideal for capturing the detailed topography of biofilms. It scans the entire surface area at once, returning results in a fraction of the time required by other optical profilometry techniques, providing a more comprehensive picture of the biofilm's structure with larger field of view while maintaining lower noise.

The result is superior accuracy in imaging biofilm heterogeneity, as validated through comparative topographic studies where CSI outperforms tactile profilometers and AFM for biofilm integrity and coverage.

This multi-point simultaneous scanning approach is especially beneficial for measuring heterogeneous biofilms that may vary significantly across their surface.

Additionally, the compact, benchtop design of the ZeGage Optical Profiler makes it both economical and accessible for a wide range of laboratories. Minimal training is required, so labs can get accurate, repeatable measurements without the need for highly specialized personnel.

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Results_

Overall, the lab found that the ZeGage Optical Profiler could provide researchers with a superior, user-friendly solution for biofilm measurement that would resolve the team's challenges. The biofilm research team is highly enthusiastic about the measurement data they've been able to achieve with the ZeGage Optical Profiler.

They find that it:

Eliminates sample preparation

No complex sample preparation required, including fixation, staining, and mounting, which can be time-consuming and labor-intensive. Non-invasive, non-contact, metrology preserves biofilm integrity.

Increases imaging speed

Acquires images of larger surface areas more quickly, for faster data collection and analysis.

Enables time-lapse measurements

Records dynamic changes so that researchers can observe biofilm growth and evolution over time. Auto focus for long term measurements avoids media evaporation issues.

Speeds data analysis

Produces simpler and more straightforward data sets, reducing the time required for data analysis.

Increases accuracy

Captures 3D surface topology measurements with topography measurement noise at the nanometer level.

Eases adoption

Comes as a compact, benchtop instrument that is economical and intuitive to use.

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Distribution in the UK & Ireland

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