CASE STUDY

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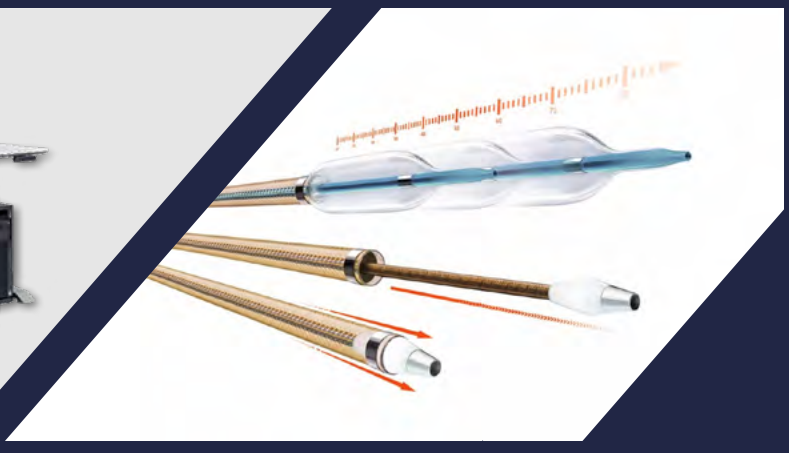
BIOTRONIK

Hitachi's SEM and Ion Milling Systems Aid Biotronik's Biomedical Technology Research



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Background

Incorporated in 1961, Biotronik is a **leading manufacturer of cardiovascular biomedical technologies** for the diagnosis and treatment of many different kinds of cardiovascular disease. Headquartered in Berlin, Germany, the company employs over 9,000 people globally in 100 countries, producing all components in-house.

Research and development is a central concern for Biotronik, with one in every five employees at their German HQ working in R&D. Sample preparation and analysis are crucial for understanding the **intimate microscale details of technologies** developed by the company, whose guiding principle is “excellence for life”, helping them to improve the well-being and lives of patients suffering from debilitating and potentially fatal heart and circulatory conditions.

Objectives

Prepare and image complex, real-world cardiovascular samples.

Improve the early detection of major failures in Biotronik’s product line.

Expand the company’s customer base and R&D efforts.

Understanding the Complex Nature of Real-world Samples in the Cardiovascular Treatment Industry

When looking for new equipment to improve the preparation and analysis of various specimens in their company's R&D department, Biotronik carried out a very thorough tender process, benchmarking options and testing them against various highly challenging sample types from the cardiovascular field.

The company had a number of objectives when choosing new sample preparation and specimen analysis equipment, which led them, after this tender process, to choose Hitachi's ArBlade 5000 Broad Ion Beam Milling system and SU7000 Field Emission Scanning Electron Microscope.

In the past, Biotronik relied on SEMs with tungsten emitters, and switching to a latest-generation device with a Schottky emitter really was a game changer for them. Furthermore, the versatile applicability and flexibility of Hitachi's microscope regarding samples and sample size, especially for non-conductive samples, was a particular advantage for Biotronik.

Imaging
Hitachi's SU7000 SEM

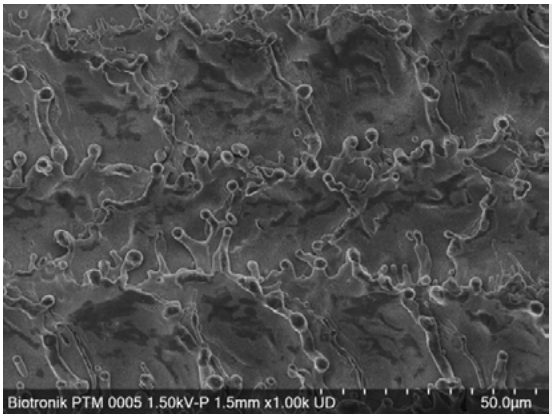
+

Sample Preparation
ArBlade 5000 Broad Ion Milling system

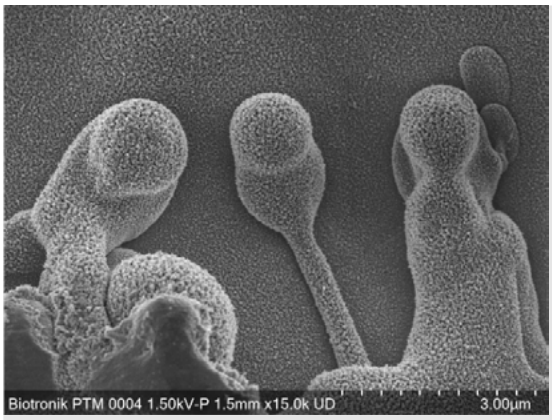
Combining the imaging power of **Hitachi's SU7000 SEM** with the sample preparation capabilities of the **ArBlade 5000 Broad Ion Milling system** made particularly challenging preparatory tasks solvable. Components from the pacemaker industry could be easily prepared and sectioned, which would have been difficult with other technologies under consideration by the company.

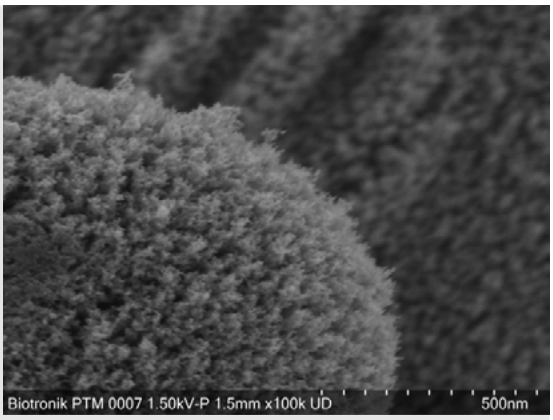
Biotronik Use-Case 1

Characterisation of the bond between a laser-structured surface and a synthetic resin with the use of a primer.

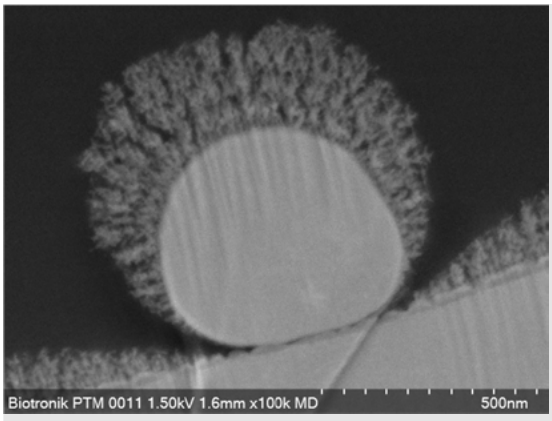


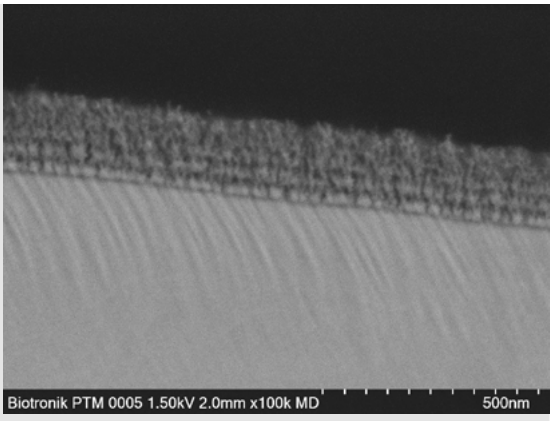
Typical metallic surface after laser structuring to improve the mechanical clarification of the synthetic resin.





At high magnifications, a nanostructure becomes visible on the surface that has not been observed before and is subsequently mainly responsible for the adhesive properties and the absorption of the primer.

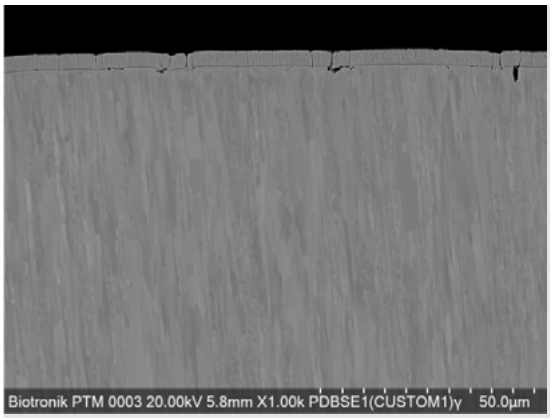


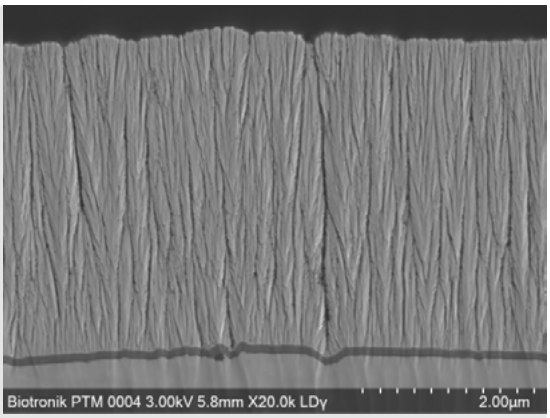


The cross section with the ArBlade 5000 using the metal-primer-resin system reveals a gap-free and perfect bond between the materials involved.

Biotronik Use-Case 2

Characterisation of an adhesive layer





The cross section with the ArBlade 5000 by the metal adhesion layer functional layer system reveals a thin adhesion layer in the range of 80nm to 90nm.

Technology that Innovates and Inspires

As a Biotronik representative said: **“We had to go through a thorough business case to justify the investment, it was a close decision and only fine details decided and the combination with the Argon Ion Polisher product helped to make this decision.”**

They continued: **“Everything went perfectly and without any issues. Room planning and the implementation of the requirements were a bit tricky, but they were successfully carried out through very close collaboration.”**

> **“I would definitely recommend Hitachi to other interested parties and would also choose Hitachi again in a subsequent decision.”**

Results

Management of non-conductive samples.

Combining sample preparation with the ArBlade 5000 and the imaging power of the SU7000 made it easier and faster to get the results for components from the pacemaker industry.

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