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#### ● Welcome

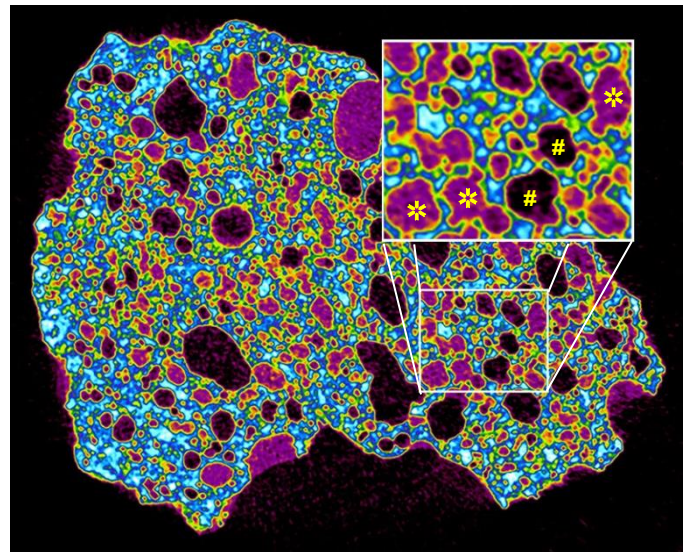
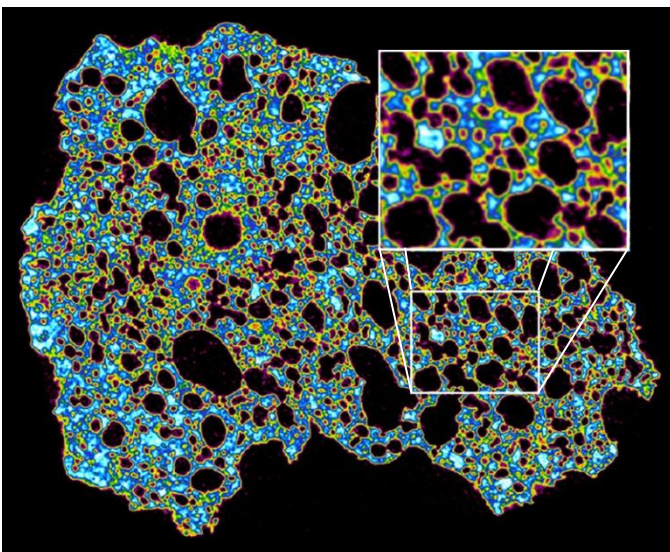
Have you ever tried to find identical slices in different scans where you want to compare the effect of a treatment or the evolution over time, to obtain 'matching' pictures for your publication or to save datasets in the same orientation for generating identical movies? Image registration using SkyScan DataViewer software provides the solution. This fifth issue of the Bruker micro-CT Academy explains in detail how to perform dataset registration in multiple application areas.

#### ● Basic and advanced image and dataset registration

Image registration is the process of transforming different datasets into one coordinate system. Image registration algorithms can be classified into intensity-based (comparing intensity patterns) and feature-based (comparing points, lines, and contours) algorithms. Depending on the transformation model they apply, both rigid (linear transformations) and non-rigid transformation (elastic transformations) exist. DataViewer (version 1.5.0.0 onwards) provides tools for rigid intensity-based image registration both in 2D and 3D. How to perform this image registration in DataViewer is explained step

by step in "[MN063 Image and dataset registration in DataViewer - Expanded clay](#)" and "[MN044 Image and dataset registration in DataViewer – Tooth](#)". The first method note makes use of a granule of expanded clay before and after moistening while the second method note uses a tooth before and after root canal treatment.

As the registration algorithm in DataViewer is rigid and intensity-based, one might experience that the registration of objects with big changes in internal morphology is less accurate. For example the morphology of the trabecular network inside long bones changes significantly upon pharmaceutical treatment,



Matching 2D pseudo-colored reconstructed images of dry (left) and moistened (right) expanded clay after registration showing part of the pores being filled with water (\*) in contrast to others (#).

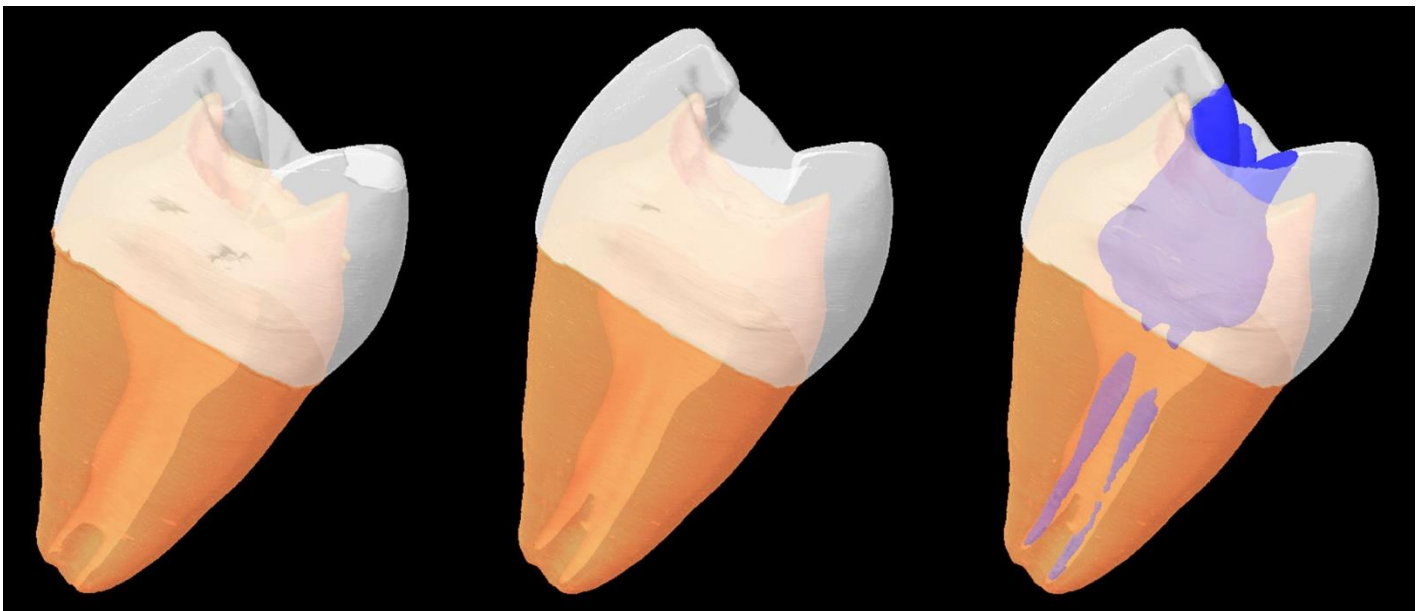
possibly precluding accurate intensity-based registration of these scans. However, the outside anatomy of these bones does not change (that's why we can recognize all bones in the body based on their specific shape), making feature-based registration a more appropriate registration algorithm. "[MN048 Advanced image registration in DataViewer](#)" illustrates how rigid intensity-based registration can still be used to mimic feature-based registration. This protocol uses a binary mask of the sample to match and copies these transformation parameters to the original dataset.

● Bruker micro-CT News

Bruker microCT is proud to announce the first [Asia-Pacific User Meeting](#) on Nov. 18-19 in Taipei, Taiwan. The program includes user presentations, workshops and hands-on training sessions covering both life science and material science applications. [Register here!](#) We hope to welcome you there!

A dedicated U.S. user meeting will be held by our local partner, Micro Photonics, Inc., on Sep 10-11 in Houston, TX. Click [here](#) for more information!

● Image of the Month



Surface rendered 3D models of a tooth before (left) and after (middle) root canal treatment. The right panel shows an overlay with the material removed upon root canal treatment. This model was generated from the different dataset after registration. White: enamel, Orange: dentin, blue: material that was drilled out.

● Upcoming Events

Bruker microCT will participate with an exhibit in the forthcoming conferences. Please click the link below for more information. We hope to see you there!

|                         |               |                       |
|-------------------------|---------------|-----------------------|
| ▪ <a href="#">ESB</a>   | Aug 31- Sep 3 | Liverpool, UK         |
| ▪ <a href="#">IMA</a>   | Sep 1-5,      | Gauteng, South Africa |
| ▪ <a href="#">IMC</a>   | Sep 7-12      | Prague, Czech Rep.    |
| ▪ <a href="#">ASBMR</a> | Sep 12-15     | Houston, USA          |
| ▪ <a href="#">WMIC</a>  | Sep 17-20     | Seoul, South Korea    |
| ▪ <a href="#">IMPC</a>  | Oct 20-24     | Santiago, Chile       |
| ▪ <a href="#">XRM</a>   | Oct 26-31     | Melbourne, Australia  |

● Answer to the last issue's image of the month



Piece of scourer (stainless steel cleaning sponge) scanned in the SkyScan1172 at 80kV/ 100uA, 0.5mm Al filter, 4µm pixel size.